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June 1985

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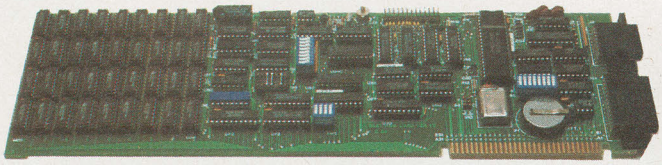

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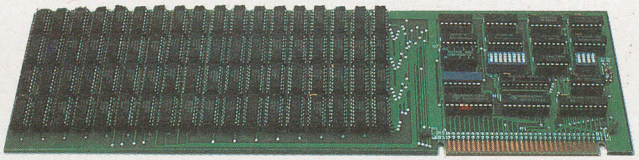

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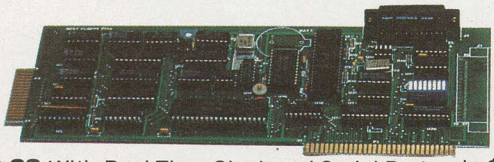

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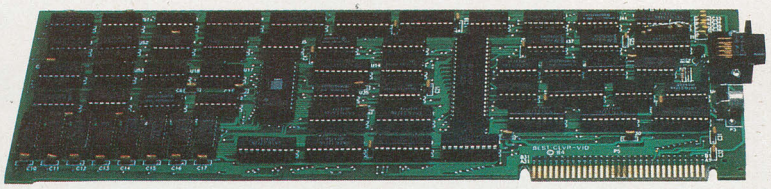

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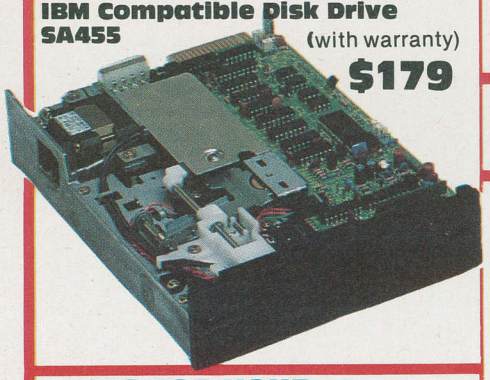

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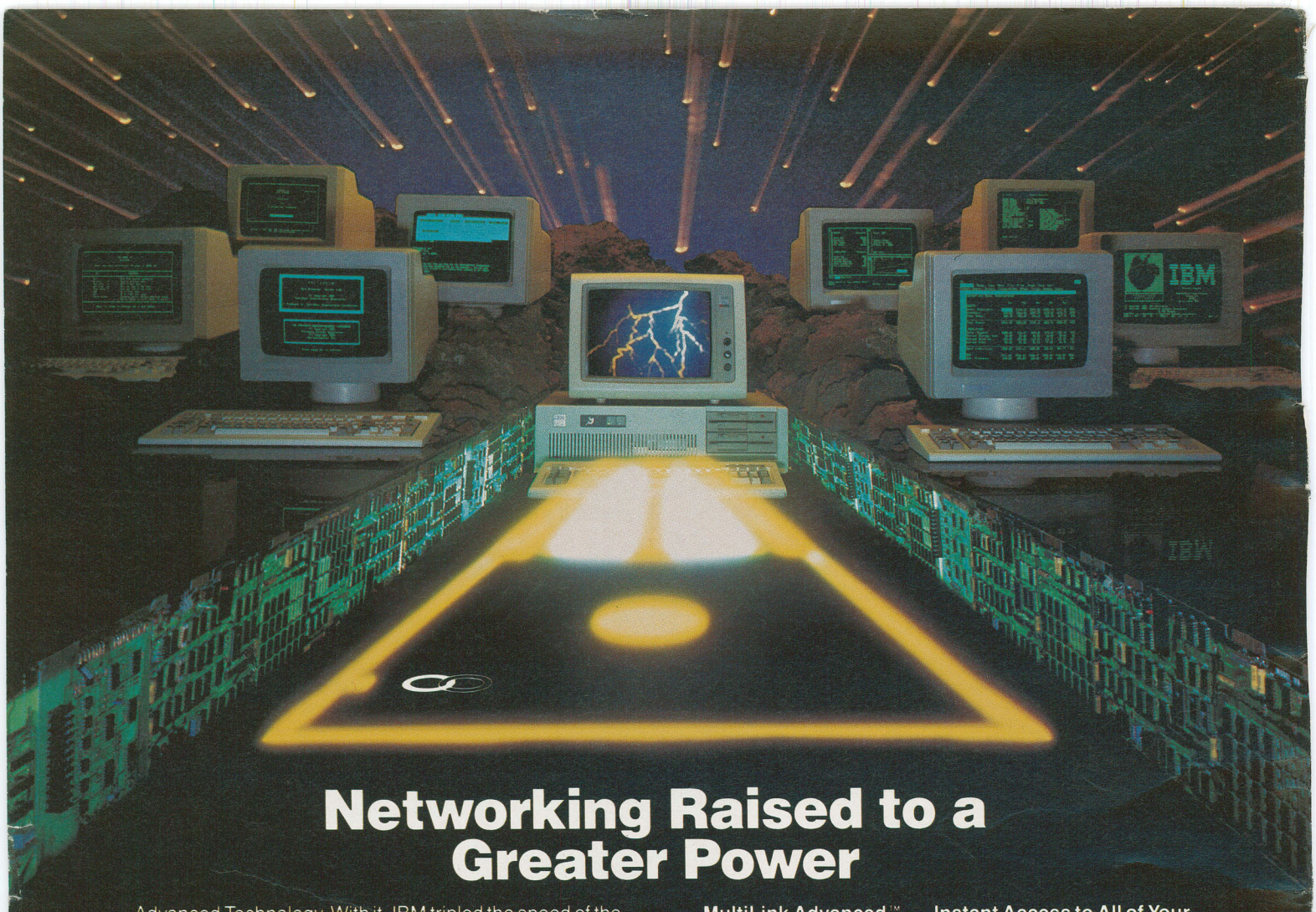

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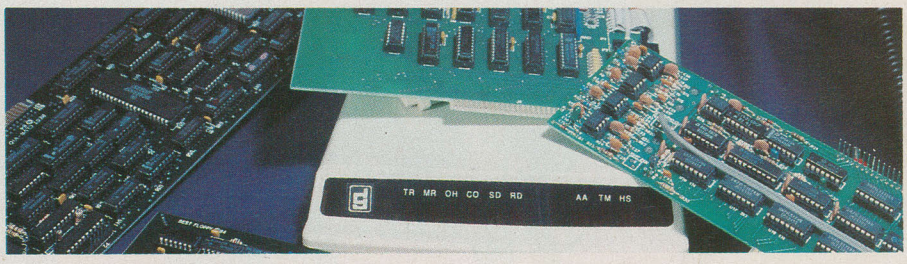
June 1985

Hold On The Mac... the Macintosh issue which we promised in last month's Computing Now! got put on hold for one month because a lot of the stuff we wanted to review hadn't turned up in time. Our appologies to any MacOwners who were waiting for it.



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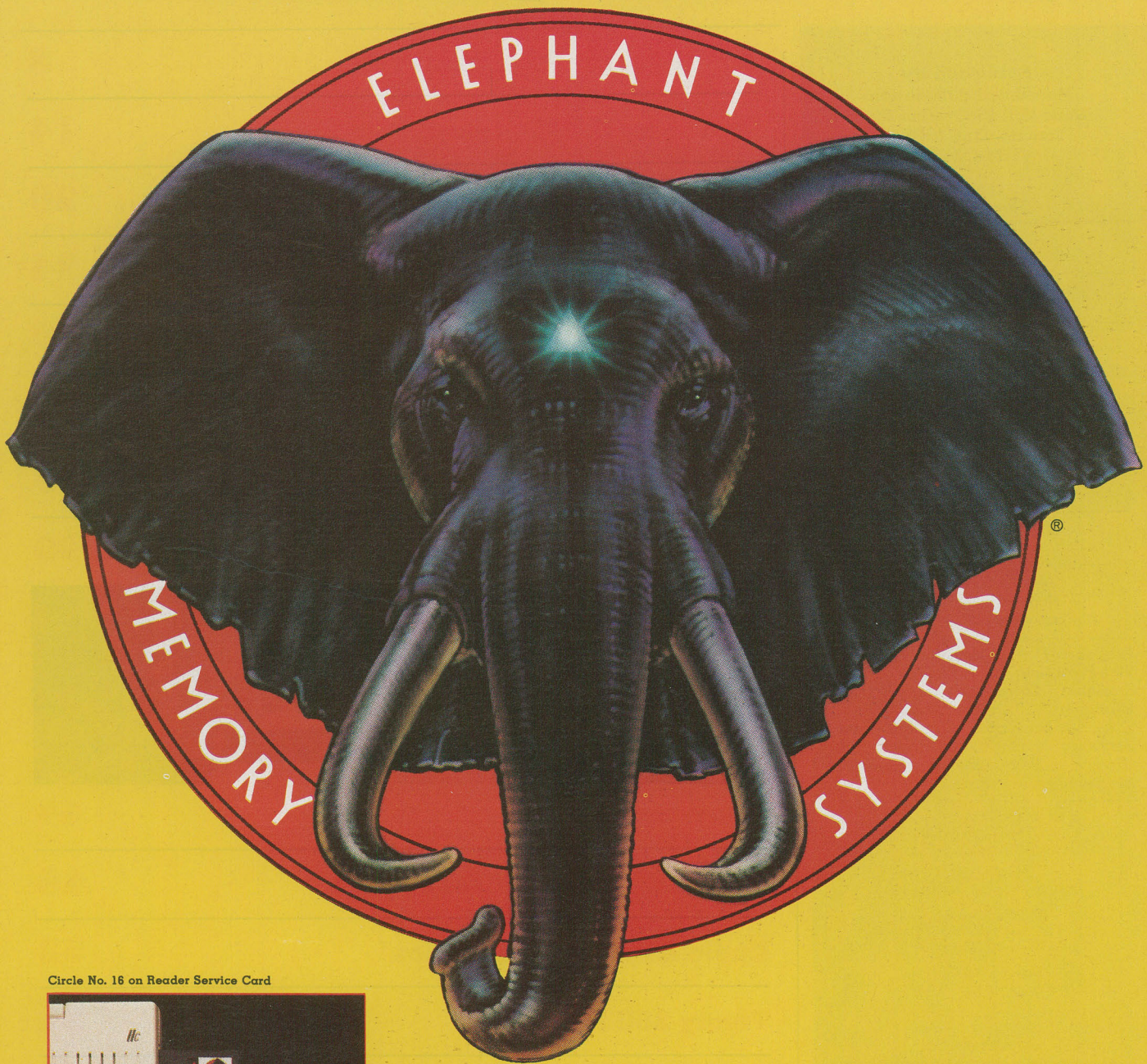

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COMPUTER PRESS

by John Rudzinski (look, Mom ... a byline!)

New Blue

TORONTO, ONTARIO — Two companies, *President Computer Corporation* and *GRiD Systems Canada Incorporation*, have introduced new computers into the marketplace. Both offerings are IBM PC compatibles.

The *President Executive* is a fast 6 MHz 80286-based micro which — in its base configuration — offers 640K RAM, one 360K and one 1.2 megabyte floppy drive, one serial port and one parallel port. The Executive's internal storage capabilities range from the standard 10 or 20 megabytes to 130 megabytes. The 80286 microprocessor, incidentally, enables the Executive to match the speed of the IBM PC/AT and surpass the IBM PC's processor speed by up to seven times. Retailing for $5750.00 in its base configuration, the Executive is manufactured by President Computer Corporation at 540 Gordon Baker Road, Willowdale, Ontario M2H 3B4 (416) 495-1460.

The *GRiDCase* line of microcomputers consists of three portable computers with differing display screens. Encased in magnesium and weighing less than 12 pounds, the GRiDCase portables each have a built-in 3 1/2" 720K floppy drive, an 80C86 microprocessor, an RS232-C serial and a parallel port, an RJ-11 phone jack and one of three complements of CMOS RAM: 128K, 256K or 512K. The computers run under either MS-DOS 2.11 or GRiD-OS, or through up to 512K of user-installable ROM packs. The computers' LCD or plasma displays are capable of 80x24 character display and 640x200 pixel bit mapping. Suggested retail pricing for the GRiDCase line in their base configurations is: GRiDCase 1 (LCD display), $4585.00; GRiDCase 2 (Enhanced LCD), $4855.00; GRiDCase 3 (plasma display), $6700.00.

GRiD Systems Canada Incorporated is at 2 Park Centre, 110-895 Don Mills Road, Don Mills, Ontario M3C 1W3 (416) 446-1555.

Copy

CALIFORNIA — Apparent growing consumer concern over the inherent limitations of their copy protected software have lead numerous software houses over North America to reconsider their stance on the subject. Two companies sent us press releases to this effect, though their views differ markedly.

Thorn EMI Computer Software Incorporated is now shipping two master diskettes with each Perfect Software product for Kaypro II and Kaypro 4 systems. Should one of the masters become somewhat imPerfect, Thorn EMI will replace it — upon its return — (and $10.00) with another master within two weeks of receipt. The press release doesn't mention the possibility of *both* masters biting BDOS dust ...

According to Clem Scharwath, Thorn EMI's vice president of marketing and program development, Thorn EMI feels its new policies "... address the copy protection concerns from a software publisher's point of view, while at the same time maintaining the high level of support users demand."

WordTech Systems Incorporated has perhaps done its customers one better by simply dropping copy protection from its entire product line. David Miller, WordTech Systems' president, says their customers ... mostly program developers ... view copy protection as "... an insult to their ethics and a hindrance to their work."

The company has tried numerous copy protection schemes, but no method seemed worth the customer dissatisfaction it engendered: "All the user inconvenience produced no net benefit," maintains Miller. "We have absolutely no evidence that copy protection discouraged piracy. We're going to maintain our policy that people will buy a good product that's backed up by good support, rather than copy it."

WordTech markets *dBCompiler* and other dBASE II utility programs. The company is offering to ship unprotected upgrades of its programs to existing customers for a $25.00 handling fee.

CIS Hikes Rates

COLUMBUS, OHIO — CompuServe Information Services customers utilising DataPak are in for a bit of a surprise: they can expect to pay ten dollars U.S. per online connect hour, an almost 100 per cent increase.

Confused by the American reorganization of AT&T, CompuServe was under the misapprehension that subscribers using their services through DataPak would be individually charged by DataPak for costs incurred. CompuServe found that it had been paying the DataPak charges.

Usage of DataPak numbers that Canadian subscribers considered part of their service — such as Toronto's 366-1869 — will result in the extra charge.

CompuServe maintains that the charge only passes on current costs; it doesn't and won't include charges they have incurred in the past.

Continued on page 60

Next Month In Computing Now!

Some MacWonderful Software

We've been busy scaring up some of the more interesting applications, accessories and fetishes for the Macintosh . . . next month we're going to unpack them before your eyes. Included in the list will be:

- **Mac the Knife and ClickArt.** While both provid essentially the same things . . . new fonts and a collection of graphic images . . . anyone with a Mac and two functional eyes will want to have both of these little gems. They both provide an incredible array of visual enhancements for the system.
- **Hayden: Speller.** MacWrite may let you get words onto a page in twenty-one fonts and eight special effects but this accessory makes sure that you don't look like an illiterate buffoon in the process.
- **Plot It.** This is a very simple bit of software to reproduce MacPaint images on a plotter. It sounds a bit pedestrian but it looks wild. No one really cares what a plotter sounds like anyway.
- **Sargon III.** This is one of the first chess programs which doesn't entail entering one's moves in bizarre cryptic notation. It's a gas to play and evil as they come on the higher skill settings.

There are plenty more, but the publisher loves surprises. Wait for about thirty days and you'll be able to see them all, plus a number of other interesting things to do with a Macintosh.

CP/M for Two Bills

In the next Computing Now! we are going to look at a very powerful CP/M based computer for which the system board costs less than two hundred dollars. When it's up and running this thing allows one to get together what is absolutely the cheapest microcomputer in existence. However in its more common incarnation it's also regarded as being one of the best.

There is more to this than meets the eye . . . but all of the hidden surprises are pretty interesting too.

Blort! for the PC

This is perhaps one of the most exciting games to appear since those early video pong games you could get from K Mart. It has incredible graphics . . . in ASCII, albeit . . . and more twists and turns than Dungeons and Dragons after the computer statics out and hangs. However, it's fun to play and the assembler listing is an instructive study in the design of complex code.

While these features are in an advanced state of preparation we do reserve the right to change the contents of the final issue before going to press.

A Fontasy for the Gemini 10X

Downloading new fonts into the always ubiquitous Gemini 10X is powerful capability... one which most owners of these things never want to get involved in. Here's a blast through the details and a look at a practical program to handle it.

by Steve Rimmer

As printers go, the Gemini 10X is something of a Swiss army knife. It does a whole potful of things... none terribly well. However, it does toot along tolerably with quite a number of them. In fact, if you own one of these boxes and are into playing about with the features you will probably have found that it has quite a number of innovative things happening in there.

There's a lot to be said for the Gemini. It's cheap, uses teletype ribbons, is sort of fast, sort of Epson compatible and it can do a lot of unusual stuff. It is, to be sure, the ideal printer for people who like to play with computers.

Among the advanced features of the Gemini 10X is the facility for downloading fonts into the thing. This is one of the capabilities of the little box which only the bravest and most foolhardy every try to get into. Difficult under ideal circumstances, changing the bit patterns for the Gemini's characters is all but impossible because of some of the weirdnesses inherent in the printer's firmware.

Such a gauntlet could not stay thrown for long, of course.

In this feature we're going to look at the mechanism for getting the Gemini to recognize data sent to it as character patterns. Because this data must be sent in an usually obtuse form, we're also going to look at an editing program to generate it. While written for the IBM PC, this thing can be modified for pretty well any system with a bit of ingenuity.

Pins and Needles

Unless your orbs are a lot worse than they should be, you'll have no doubt noticed that the characters that the Gemini 10X spits onto paper are made up of dots. The dots, in turn, are caused by the impact of a matrix of pins on the printer's ribbon which, in turn, rams into the paper which you should have remembered to wind onto the platten.

In the normal course of things the patterns that determine which dots are on and which are off live in a ROM inside the printer. However, they don't have to. There is a chunk of RAM in there as well, and the software can be instructed to look to it for its bit patterns.

Unlike as in the case of the ROM, the patterns in the RAM can be altered. In fact, the Gemini allows them to be changed from outside by sending it the right series of escape sequences. The process, however, isn't all that easy because it involves taking character patterns and deriving numbers which represent their bits. Furthermore, things are even more difficult than the bit patterns involved in the characters which are displayed on a screen, as the bit patterns run vertically on the Gemini.

Given the character A, we can represent A as

```
00000000
00111100
01100110
01100110
01111110
01100110
01100110
00000000
```

You'll have seen this if you've checked out any of the character editors in previous editions of Computing Now!. The difference in this case is that the pattern is calculated up and down.

This collection of ones and zeros assembles into eight bytes which describe the pattern for the character A. You can figure them out by taking each vertical column and figuring the value of it assuming that the numbers are bits. The first column would be zero, of course. The second would be

0 * 2^0 + 0 * 2^1 + 1 * 2^2 + 1 * 2^3 + 1 * 2^4 + 1 * 2^5 + 1 * 2^6 + 0 * 2^7

which figures out as

4 + 8 + 16 + 32 + 64

which should work out to a hundred and twenty-four.

This is manifestly tedious, of course, and, as such, having understood the principal behind it we'll let a program do all the calculations from here on in.

What is more complicated still is the juggling one must do to get the Gemini to recognize the bit patterns one sends it is as data to make characters out of rather than something to print directly. The way one does this is to couch it all in a variety of interesting escape sequences.

The Gemini thinks highly of escape characters... it takes them to mean "get off line and listen up... the message you are about to hear is going to change your life." The escape... CHR$(27) in BASIC... precedes the commands to start printing in condensed mode, to get into graphics mode, to change the paper width and so on.

The escape sequence to tell the Gemini to get set up for a downloaded character is

CHR$(27) CHR$(42) CHR$(1)
CHR$(CHARACTER)
CHR$(DESCENDER)
8 bytes of bit pattern data

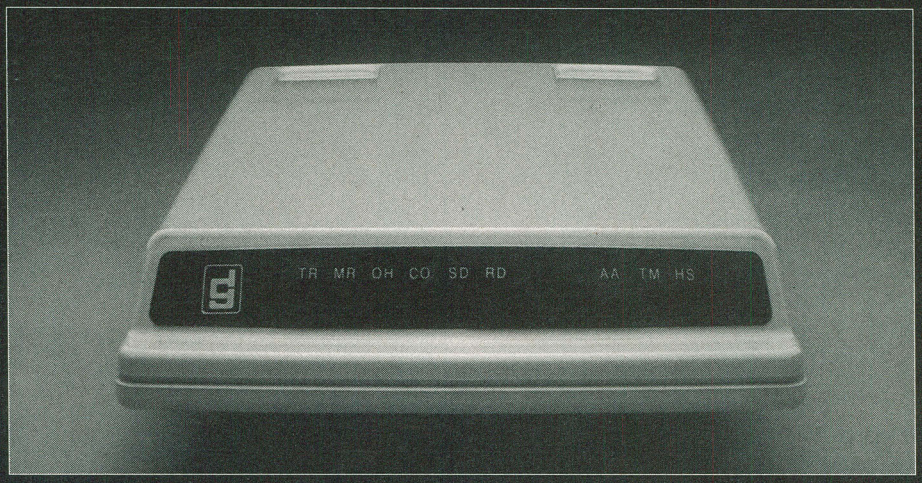
Program 1. The Font Creator

```
10 '      ================================
15 '     :                                :
20 '     :   Gemini 10x Programmable Font :
25 '     :   Editor (c) 1985 Steve Rimmer :
30 '     :                                :
35 '     :     This software may not be   :
40 '     :    distributed in any machine  :
45 '     :    form without the author's   :
50 '     :       written permission.      :
55 '     :                                :
60 '     :  "Intimidation is the highest  :
65 '     :      form of flattening"       :
70 '     :            -Chuck Shakespeare  :
75 '     :                                :
80 '      ================================
85 '
90 '
95 '
100 CLS
105 DEFAULT$ = "IBMSET" 'Default font file name
110 TYPE$ = "FNT"       'Default font file type
115 FALSE = 0 : TRUE = NOT FALSE
120 BOX$ = CHR$(219)    'Box character
125 STATUS = 22         'line to print messages on
130 WORD = 16           'Length of a record
135 SCREEN 0
140 WIDTH 80
145 KEY OFF             'Usual stuff
150 'main code
155 GOSUB 255 'get the file name
160 GOSUB 185 'get character to edit
165 GOSUB 515 'display character
170 GOSUB 295 'edit the character
175 GOTO 160
180 END
185 'Get a character to edit
190 LOCATE STATUS,1,1
195 PRINT SPACE$(79)
200 LOCATE STATUS,1,1
205 INPUT "Character ('#' followed by number or literal)";C$
210 IF LEN(C$) > 1 AND LEFT$(C$,1) = "#" THEN
      P = VAL(RIGHT$(C$,LEN(C$)-1)) : GOTO 230
215 IF LEN(C$) = 1 THEN P = ASC(C$)-30 : GOTO 230
220 BEEP
225 GOTO 185
```

A Fontasy for the Gemini 10X

```
230 LOCATE STATUS,1,1
235 PRINT SPACE$(79)
240 FIELD 1,WORD AS CHARACTER$
245 GET #1,P
250 RETURN
255 'Get a font file name
260 LOCATE STATUS,1,1
265 PRINT SPACE$(79)
270 LOCATE STATUS,1,1
275 INPUT "File name (Return for default)";C$
280 IF C$ <> "" THEN DEFAULT$ = C$
285 OPEN "R", #1, DEFAULT$ + "." + TYPE$, WORD
290 RETURN
295 'Edit the character
300 CURSORX = 10 : CURSORY = 10
305 'Main cursor loop
310 OLDCHAR = SCREEN(CURSORY,CURSORX)
315 LOCATE CURSORY,CURSORX,0
320 PRINT CHR$(206)
325 OLDY = CURSORY : OLDX = CURSORX
330 A$ = INKEY$ : IF LEN(A$) < 2 THEN 330
335 B = ASC(RIGHT$(A$,1))
340 IF B = 72 AND CURSORY > 10 THEN CURSORY = CURSORY - 1 : GOTO 385
345 IF B = 80 AND CURSORY < 17 THEN CURSORY = CURSORY + 1 : GOTO 385
350 IF B = 75 AND CURSORX > 10 THEN CURSORX = CURSORX - 1 : GOTO 385
355 IF B = 77 AND CURSORX < 17 THEN CURSORX = CURSORX + 1 : GOTO 385
360 IF B = 79 THEN 405
365 IF B = 73 THEN MATRIX(CURSORX-9,CURSORY-9) = TRUE :
    OLDCHAR = ASC(BOX$) : GOTO 330
370 IF B = 81 THEN MATRIX(CURSORX-9,CURSORY-9) = FALSE :
    OLDCHAR = 32 : GOTO 330
375 IF B = 71 THEN MID$(CHARACTER$,4,1) =
    CHR$(ABS(NOT(-1*(ASC(MID$(CHARACTER$,4,1)))))) : GOSUB 635 :
    GOTO 385
380 GOTO 330
385 'Update cursor
390 LOCATE OLDY,OLDX,0
395 PRINT CHR$(OLDCHAR)
400 GOTO 305
405 'Done editing the character
410 LOCATE OLDY,OLDX,0 : PRINT CHR$(OLDCHAR)
415 LOCATE STATUS,1,1
420 PRINT SPACE$(79)
425 LOCATE STATUS,1,1
430 PRINT "Save, Abort, Continue, Quit (S,A,C,Q)... go for it: ";
435 A$ = INPUT$(1)
440 IF INSTR("Cc",A$) <> 0 THEN GOSUB 610 : GOTO 305
445 IF INSTR("Aa",A$) <> 0 THEN RETURN
450 IF INSTR("Ss",A$) <> 0 THEN 460
455 IF INSTR("Qq",A$) <> 0 THEN CLOSE : CLS : END
460 'Replace character in file
465 FOR X = 1 TO 8
470 MID$(CHARACTER$,X+4,1) = CHR$(0)
475    FOR Y = 1 TO 8
480          MID$(CHARACTER$,X+4,1) = CHR$(ASC(MID$(CHARACTER$,X+4,1))
              + ABS(MATRIX(X,Y)) * 2^(Y-1))
485    NEXT Y
490 NEXT X
495 FIELD 1,WORD AS A$
500 LSET A$ = CHARACTER$
505 PUT #1,P
510 RETURN
515 'Display a character
520 GOSUB 660
525 FOR A = 1 TO 8
530    BYTE(A) = ASC(MID$(CHARACTER$,A+4,1))
535    FOR B = 1 TO 8
540          MATRIX(A,B) = TRUE
545          TRIAL = INT(BYTE(A) / (2^(B-1)))
550          IF (INT(TRIAL/2)) * 2 = TRIAL THEN MATRIX(A,B) = FALSE
555    NEXT B
560 NEXT A
565 FOR B = 1 TO 8
570    FOR A = 1 TO 8
```

What 3 features are most important in a PC modem?



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2. Accuracy!
3. Accuracy!

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A Fontasy for the Gemini 10X

```
575           LOCATE B+9,A+9,0
580           IF MATRIX(A,B) THEN PRINT BOX$ ELSE PRINT " "
585    NEXT A
590 NEXT B
595 GOSUB 610
600 GOSUB 635
605 RETURN
610 'Show the status line
615 LOCATE STATUS,1,0 : PRINT SPACE$(79)
620 LOCATE STATUS,1,0
625 PRINT CHR$(24) CHR$(27) CHR$(25) CHR$(26) " moves cursor,
     PgUp sets, PgDn to unsets, Home sets decndr, End to scoot"
630 RETURN
635 'Show the decender flag
640 LOCATE STATUS-2,1,0 : PRINT SPACE$(79)
645 LOCATE STATUS-2,1,0 : PRINT "Decender flag: ";
650 IF ASC(MID$(CHARACTER$,4,1)) THEN PRINT "On" ELSE PRINT "Off"
655 RETURN
660 'Draw a frame
665 LOCATE 9,9,0 : PRINT CHR$(201) STRING$(8,205) CHR$(187)
670 FOR X=10 TO 17
675   LOCATE X,9,0 : PRINT CHR$(186) SPACE$(8) CHR$(186)
680 NEXT X
685 LOCATE 18,9,0 : PRINT CHR$(200) STRING$(8,205) CHR$(188)
690 RETURN
```

Although I've put the separate elements of this thing on individual lines, in practice the whole party is sent without carriage returns.

The first part is the aforementioned escape sequence. It tells the printer to expect the downloading of one character. The Gemini can accept up to ninety-six downloaded characters, so in order to change all of them one would have to send this whole party ninety-six times.

The next byte is the ASCII value of the character we wanted to redefine. If we wanted to define A, for example, we would make this number sixty-five.

Following this is the descender flag. This is a very sleazy way of handling descenders. Inasmuch as the characters which have descenders are all lower case... and rather shorter than upper case trolls... the Gemini expects them to be defined as undescended characters, that is, with their descenders on the base line of the normal symbols. However, by setting the descender byte to one, rather than zero, its usual state, the character in question will be shifted downwards by two dots.

Having downloaded one or more characters it is still necessary to tell the printer to recognize its RAM area as the source of these bit patterns, as opposed to the ROM it's so fond of. There's another escape sequence for this, of course...

CHR$(27) CHR$(36) CHR$(1)

There's also

CHR$(27) CHR$(36) CHR$(0)

to switch them back, so that the ROM patterns are in effect. There's a catch in this... a line of print which is defined as being either ROM characters or downloaded characters must be exclusively one or the other... because of the way the Gemini prints one cannot switch half way through.

Finally, issuing the sequence

CHR$(27) CHR$(42) CHR$(0)

makes the patterns in the RAM equal to the patterns in the ROM. If you don't do this all the patterns in the ROM will be blank, so unless you are up for redefining the entire character set there will be gaps in the patterns. In other words, if we define A it will print. If we don't define B it won't.

Having sent the instruction for the printer to copy its ROM into its RAM one can selectively change only those patterns one wishes to.

Fontastic Voyages

In practice, playing with the downloadable fonts of the Gemini takes an awful lot of work... even if you have some character editing software like the programs we'll look at in a minute. However, there are some tricks one can lay on the thing to get the wombats out partying a bit quicker.

```
100 '      ================================
105 '     :                                :
110 '     :   Gemini 10x Programmable Font :
115 '     :   Editor (c) 1985 Steve Rimmer :
120 '     :                                :
125 '     :     This software may not be   :
130 '     :    distributed in any machine  :
135 '     :    form without the author's   :
140 '     :       written permission.      :
145 '     :                                :
150 '      ================================
155 '
160 ' Comment out line 265 if you're in a hurry
165 '
170 ' Character file maker
175 DEFINT A-Z
180 COUNT = 1
185 WORD = 16
190 FONT$ = "IBMSET.FNT"
195 KILL FONT$
200 OPEN "O", #1,FONT$,WORD
205 PRINT #1,CHR$(27) + CHR$(42) + CHR$(0) + STRING$(WORD-4,0)
     + CHR$(13);
210 SCREEN 1
215 CLS
220 BOX$ = "*"
225 TRUE = -1 : FALSE = NOT TRUE
230 FOR X=32 TO 127
235 LOCATE 1,1,0
240     PRINT CHR$(X)
245 LOCATE 1,15,0
250 PRINT "Character: " X
255     GOSUB 310 'BREAK DOWN THE CHARACTER
260     GOSUB 350 'SAVE THE CHARACTER TO DISK
265 '   GOSUB 10000 'DISPLAY THE CHARACTER
270 NEXT X
275 CLS
280 PRINT #1,CHR$(27) + CHR$(36) + CHR$(1) + STRING$(WORD-4,0)
     + CHR$(13);
285 TERM$ = CHR$(0)
290 PRINT "All done..."
295 CLOSE
300 SCREEN 0 : WIDTH 80
305 END
310 'BREAK DOWN THE CHARACTER
315 FOR J = 1 TO 8
320 BYTE(J) = 0
325    FOR K = 1 TO 8
330           IF POINT(J-1,K-1) <> 0 THEN BYTE(J) = BYTE(J)
               + 2^(K-1)
335    NEXT K
340 NEXT J
345 RETURN
350 'SAVE THE CHARACTER TO THE DISK
355 DECEND$ = CHR$(0)
360 CHARACTER$ = ""
365 FOR Z = 1 TO 8
370    CHARACTER$ = CHARACTER$ + CHR$(BYTE(Z))
375    IF BYTE(Z) > 127 THEN DECEND$ = CHR$(1)
380    BYTE(Z) = 0
385 NEXT Z
390 IF DECEND$ = CHR$(0) THEN 410
395 FOR Z = 1 TO 8
400    MID$(CHARACTER$,Z,1) = CHR$(ASC(MID$(CHARACTER$,Z,1))/2)
405 NEXT Z
410 IF COUNT < 5 THEN COUNT = COUNT + 1 ELSE COUNT = 0 :
     TERM$ = CHR$(13)
415 CHARACTER$ = CHR$(27) + CHR$(42) + CHR$(1) + CHR$(X) + DECEND$
     + CHARACTER$ + STRING$(WORD-14,0) + TERM$
420 TERM$ = CHR$(0)
425 PRINT #1,CHARACTER$;
430 RETURN
435 'Display a character
440 FOR A = 1 TO 8
445    BYTE(A) = ASC(MID$(CHARACTER$,A+5,1))
450    FOR B = 1 TO 8
455           MATRIX(A,B) = TRUE
460           TRIAL = INT(BYTE(A) / (2^(B-1)))
465           IF (INT(TRIAL/2)) * 2 = TRIAL THEN MATRIX(A,B) = FALSE
470    NEXT B
475 NEXT A
480 FOR B = 1 TO 8
485    FOR A = 1 TO 8
490           LOCATE B+10, A+10, 0
495           IF MATRIX(A,B) THEN PRINT BOX$ ELSE PRINT " "
500    NEXT A
505 NEXT B
510 RETURN
```

The two programs here generate a ninety-six character downloadable font file for the Gemini and then give one the opportunity to edit it. The file... IBMSET.FNT... consists of all the font data plus the assorted escape sequences imbedded in it so that the characters can be downloaded by simply printing the file as one would any text file.

To get the patterns happening one would

PRINT IBMSET.FNT

from DOS.

The printer will roll up about eight lines when you do this, but it shouldn't print anything.

Rather than creating a whole bunch of pattern definitions by hand the font creator program... the first listing... sets up patterns by using the character patterns for the IBM's video display. If I were going to go about this correctly I would have PEEK'd them out of the BIOS and done all the bit manipulations mathematically. As it is... sloth having gotten the better of me... I printed the characters on the screen and read off each bit with the SCREEN(X,Y) function.

Depending upon whether you elect to comment out line two sixty-five or not, this thing will take between one and five minutes to run. When it's over you will have a file with the escape sequence to copy the ROM patterns into the Gemini's RAM... not absolutely necessary in this application... ninety-six character redefinition sequences and a final line to tell the printer to start looking at the patterns in its RAM.

If you get out of BASIC and PRINT the file, anything else you send out to the printer will turn up in a very bizarre font indeed, one which you'll probably never have seen the Gemini do before. This is what the IBM's screen display font looks like when it's printed out on paper.

It doesn't make a particularly good printer font.

In order to make things simpler later on, all of the lines in the file are padded out to sixteen characters with CHR$(0)'s, or nulls. The Gemini ignores these.

The font editor... the second listing... will suck in the IBMSET.FNT file and allow you to call up the character patterns and change them. It's fairly straight up to use. However, if you change the patterns in the file and send it to the printer again you will find that the hard copy characters will change again. You can create all the fonts you can think of by storing them in different .FNT files.

The only mildly confusing aspect of the editor is its insistence on having you set the descender flag we talked about earlier. If you leave it off, any character which was supposed to have a descender will wind up hammered up to the base line.

Spilled Ink

Being able to change the appearance of the characters the Gemini spits out can be mildly amusing or extremely useful. You don't have to change whole set, as I've done, and you don't have to change things in order. As such, you can redefine a few symbols for special applications, such as foreign languages or scientific stuff.

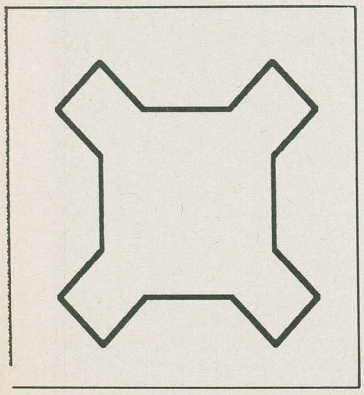
The font creator is fairly easily modified to handle smaller files. Just make sure that it puts the final escape sequence... that's line 280... after the last pattern you put in the file. Because this program treats the font file as sequential it should stick it in the right place all by itself.

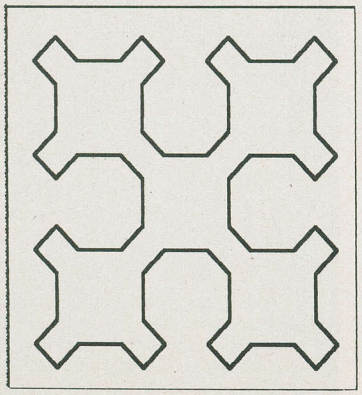
Now... let's see, how to put a laser in the Gemini... Yes, this is the real trick, and I don't think there's an escape sequence that'll handle it. Drat. **CN!**

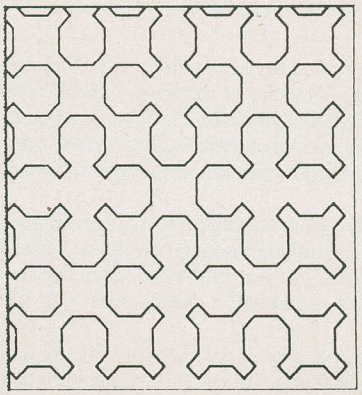
Curves For the Macintosh

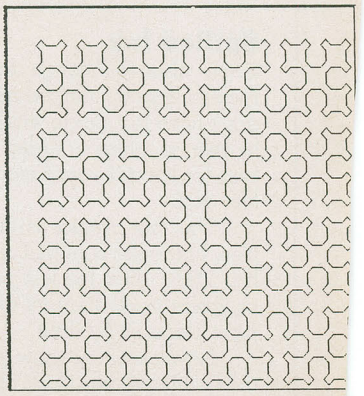
A Sierpinski curve plotting routine will certainly complete your collection of pointless BASIC programs. It will also show you how to manipulate the Macintosh's QuickDraw polygon routines... not an easy task. Higher mathematics beckons from the void.

by Steve Rimmer









Not everyone wakes up at three in the morning glistening with an unearthly cold sweat, burning with the desire to plot a couple of decent recursive curves. In fact, most people don't really think about fractals and other mathematical peculiarities at all unless they absolutely have to.

A program to plot Sierpinski curves on the Macintosh, then, may not really blow you away. However, this one has two extremely potent features to it.

The first, and by far the most important is that it produces these really slick looking pictures that you can lay on your friends or your cat... I tried them on Horatio, who thought they were pretty weird and thereupon tried to ingest them. The result of this program just looks extremely mathematical and will make people think you really know a lot about all those equations that have more answers than they do variables. If you don't want to call it a Sierpinski curve you can say it's a domain plot for the ninth variant of a quadra-dimension meson quark factory. Chances are no one will know the difference.

The second function of all this code is to look at some of the most complex of all the QuickDraw ROM routines in the Mac, the polygon handlers. Unlike the rectangle manipulators, the polygon routines deal with shapes that can be of any size and ofextreme complexity. However, if you master them you can make the little fruit draw like the wind... very much faster than it would be able to do under BASIC.

Poly Wanna MacCracker

For those who insist on knowing such things, a Sierpinski curve... designed by some character named Sierpinski, no doubt... is a curve which fully encloses its interior space and has an internal area approaching half the area of the square that it occupies. Deadly dull, this. However, what is important, for our purposes, is that Sierpinski curves can be generated programmatically and that they have lots and lots of corners.

This example needs a figure with lots and lots of corners to make much sense and no one really wants to have to enter thirty-two K worth of DATA statements.

The program accompanying this article is a pretty standard approach to creating a Sierpinski curve of any desired complexity. It can be found in versions for most computers that can support high resolution graphics. The tricky bit is not in calculating the points which define the corners of the curve, but, rather, in figuring out the best way to plot the lines that connect them.

A first order curve is a pretty simple thing. A sixth order curve is mind wrenchingly complex, requiring as much as several hours to plot if you choose a fairly slow way of doing it. This, then, is good problem to use to check out the efficiency of the various ways one can get lines on the tube.

The obvious way to draw one of these things is to move to the first point on the curve...

PSET (X,Y)

and thereafter to use the

LINE -(X,Y)

instruction to join things up. However, this is unusually slow, resulting in the more complex plots getting a bit interminable.

If you've checked out the back of the Microsoft BASIC manual you'll know that many of the graphics functions of the Macintosh can be accessed directly through ROM calls. If you use these things, rather than their BASIC equivalents, the actual drawing time one requires to get everything happening is reduced considerably.

The punch drunk wombat in the works is that it still takes BASIC itself rather a long time to deal with its data and pass control over to QuickDraw. As such, simply replacing the LINE instructions with LINETO calls doesn't really make that much difference in the execution time of the code.

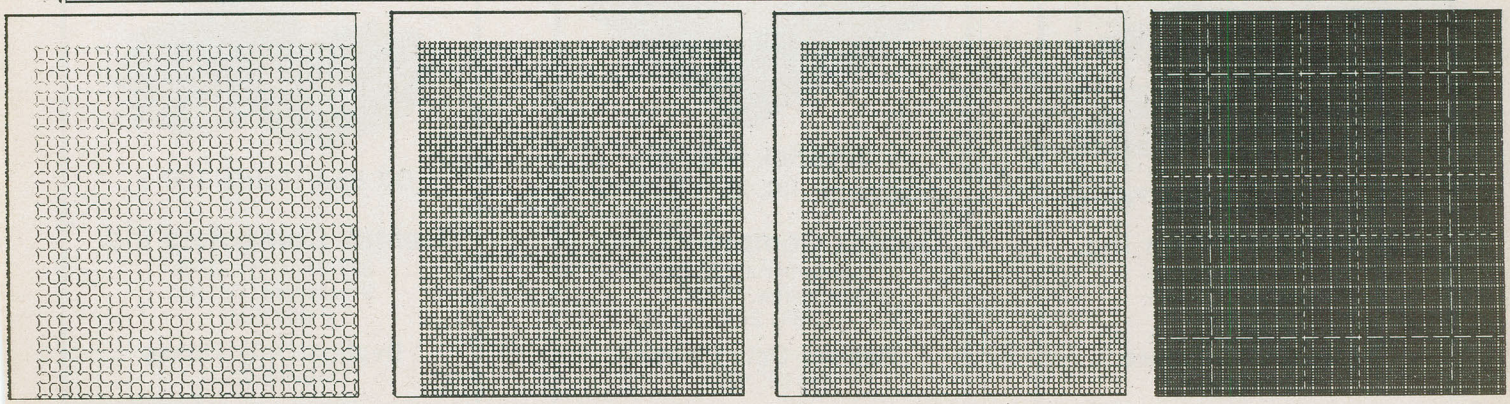
The Sierpinskis... or whatever one calls the elements of the curve... still ooze out onto the screen like gophers in a tar pit.

The solution to this lies in passing more data to QuickDraw in one pass and then letting it deal with things. You can do this, in fact, quite nicely by using the polygon routines to plot lines.

A polygon... in words the Mac would understand... is any collection of adjoining line segments. This means that a polygon on the Mac need not actually be closed. As such, we can define portions of a complex Sierpinski curve as polygon and then turn the Mac loose plotting them.

As in the case of the rectangle routines we've looked at in previous issues of Computing Now!, the polygon data is passed to the QuickDraw handler by stacking it up in an integer array. The trick is that a polygon can have any number of corners and can sprawl over all sorts of screen real estate. As such, the specifications passed to the QuickDraw ROM must be a bit trickier.

Actually, they're weird. If we allow that the polygon data is to be held in the array Poly%, the first five elements of the array must be set up to tell the Mac what the rest of the data means. Poly%(0) is the index. This tells the ROM how long the rest of the data is. However, it tells it in bytes, rather than array entries. Since these are integer arrays, however, and an integer takes up two bytes in actual memory... trust me, it does... we can figure the



Curves For the Macintosh

index by multiplying the number of array elements by two. This includes the two bytes taken up by Poly%(0), by the way.

The next four elements specify the maximum size of the polygon. Poly%(1) is the top of the space, Poly%(2) is the left side, Poly%(3) is the bottom and Poly%(4) is the right edge. The remaining data must define a polygon to fit into this space.

It isn't necessary to define all this data in the order in which it appears in the array. As such, we can update Poly%(0), the index, if we want to add more corners to the polygon.

Polyethylene Terephthalate Isophthalate

The polygon data itself works a bit like the shape tables in an old Apple II+. Beginning with Poly%(5) we have two bytes... one array element... which defines the vertical co-ordinate of the first point in the polygon. Poly%(6) is the horizontal value. Yes, they are reversed from the way these things are usually specified, but, then, the Mac was designed in California.

Each odd array element defines a subsequent vertical co-ordinate and each even one a horizontal co-ordinate.

When you call a polygon routine, as in

CALL FRAMEPOLY(VARPTR(Poly%(0)))

the QuickDraw routine is passed a pointer to the first element, the index, in this array and takes things from here. It knows how many valid co-ordinates are in the array by the value in the index.

```
'  ------------------------------------------
'
'              Sierpinski Curve Program
'                for the Apple Macintosh
'           Copyright ) 1985 Steve Rimmer
'
'         No earthly use that I can think of
'                but it's a toot to watch.
'
'       This program may not be distributed
'      in machine readable form without the
'           author's written permission.
'
'       Illustrates differences in plotting from
'       BASIC versus plotting with QuickDraw
'      polygon manipulation routines. Version
'      one... which uses the BASIC routines... is
'              marked with three dashes.
'
'  ------------------------------------------

DEFINT A-Z
DIM poly%(255)

BoxDensity = 275
BoxLeft = BoxDensity + 75
BoxRight = BoxLeft + 40
BoxTop = 100
BoxBottom = BoxTop + 25

Blank%(0) = 0 : Blank%(1) = 0 : Blank%(2) = 0 : Blank%(3) = 0
CellFactor = 1
LineWidth = 4
GOSUB InitPoly '--- Not here for version 1
```

```
MainLoop:
        CornerCount = 0
        GOSUB ClearFrame
        a$ = "Stop"
        GOSUB BeepBox
        CALL MOVETO(BoxDensity+50,40)
        PRINT "Density:" CellFactor
        CALL MOVETO(BoxDensity+50,60)
        PRINT SPACE$(100)
        CALL PENSIZE(LineWidth,LineWidth)
        CellFactor = CellFactor * 2
        SquareCell = BoxDensity /CellFactor/4
        X = BoxDensity - 5 * SquareCell
        Y = BoxDensity - 2 * SquareCell
        PlotVector = 1
        '--- CALL MOVETO(X,Y) for version 1
        GOSUB DrawLine '--- not here for version 1
        X = X + SquareCell
        A = CellFactor
        B = CellFactor
        GOTO Skip1
Skip0:
        IF A = CellFactor AND B = CellFactor THEN Skip4
Skip1:
        P = CellFactor
        Q = A
        R = B
Skip2:
        IF MOUSE(0) = 1 AND MOUSE(1) >= BoxLeft AND MOUSE(1)
            <= BoxRight AND MOUSE(2) >= BoxTop AND MOUSE(2)
            <= BoxBottom THEN Skip4
        IF p < 2 THEN Skip4
        IF P = 2 THEN GOSUB NotCentre : GOTO Skip0
        P = P / 2
        IF Q < P OR P+1 < Q THEN Skip3
        IF R < P OR P+1 < R THEN Skip3
        GOSUB PlotCentre
        GOTO Skip0
Skip3:
        IF Q >= P THEN Q = Q - P
        IF R >= P THEN R = R - p
        GOTO Skip2
Skip4:
        GOSUB PrintPoly    '--- Not here for version 1
        CALL MOVETO(BoxDensity +50,60)
        PRINT "Corner count:" CornerCount
        a$ = "Next"
        GOSUB BeepBox
        GOSUB WaitBox
        IF LineWidth > 1 THEN LineWidth = LineWidth - 1
        GOTO MainLoop
    BEEP
    a$ = INPUT$(1)
    END

PlotCentre:
    ON PlotVector GOTO Plot1, Plot2, Plot3, Plot4
Plot1:
    X = X + SquareCell
Oplot1:
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y + SquareCell
    GOSUB DrawLine
    Y = Y + SquareCell
    B = B + 1
    PlotVector = 4
    RETURN
Plot2:
    Y = Y - SquareCell
Oplot2:
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y - SquareCell
    GOSUB DrawLine
    X = X + SquareCell
    A = A + 1
    PlotVector = 1
    RETURN
Plot3:
    X = X - SquareCell
Oplot3:
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y - SquareCell
    GOSUB DrawLine
    Y = Y - SquareCell
    B = B - 1
    PlotVector = 2
    RETURN
Plot4:
    Y = Y + SquareCell
Oplot4:
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y + SquareCell
    GOSUB DrawLine
    X = X - SquareCell
    A = A - 1
    PlotVector = 3
    RETURN

NotCentre:
    ON PlotVector GOTO Off1, Off2, Off3, Off4
Off1:
    X = X + SquareCell
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y + SquareCell
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y - SquareCell
    GOTO Oplot3
Off2:
    Y = Y - SquareCell
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y - SquareCell
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y - SquareCell
    GOTO Oplot4
Off3:
    X = X - SquareCell
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y - SquareCell
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y + SquareCell
    GOTO Oplot1
Off4:
    Y = Y + SquareCell
    GOSUB DrawLine
    X = X - SquareCell
    Y = Y + SquareCell
    GOSUB DrawLine
    X = X + SquareCell
    Y = Y + SquareCell
    GOTO Oplot2

BeepBox:
    Rect%(0) = BoxTop : Rect%(1) = BoxLeft
    Rect%(2) = BoxBottom : Rect%(3) = BoxRight
    CALL ERASEROUNDRECT(VARPTR(Rect%(0)),16,16)
    CALL MOVETO(BoxLeft + 6, BoxBottom - 8)
    PRINT a$
    CALL PENSIZE(2,2)
    CALL FRAMEROUNDRECT(VARPTR(Rect%(0)),16,16)
    RETURN

WaitBox:
    WHILE  NOT MOUSE(0) : WEND
    IF MOUSE(1) >= BoxLeft AND MOUSE(1) <= BoxRight
        AND MOUSE(2) >= BoxTop AND MOUSE(2)
        <= BoxBottom THEN BoxClick
    GOTO WaitBox
BoxClick:
    CALL INVERTROUNDRECT (VARPTR(Rect%(0)),16,16)
    WHILE MOUSE(0) : WEND
    CALL FILLROUNDRECT(VARPTR(Rect%(0)),16,16,VARPTR(Blank%(0)))
    RETURN
```

Curves For the Macintosh

```
ClearFrame:
    CALL PENSIZE(1,1)
    Frame%(0) = 0 : Frame%(1) = 0
    Frame%(2) = BoxDensity : Frame%(3) = BoxDensity
    CALL FILLRECT(VARPTR(Frame%(0)),VARPTR(Blank%(0)))
    CALL FRAMERECT(VARPTR(Frame%(0)))
    RETURN

DrawLine:
    '--- CALL LINETO(X,Y) : RETURN for version 1
    CornerCount = CornerCount + 1
DrawLine1:
    Poly%(Poly%(0)/2) = y
    Poly%((Poly%(0)/2)+1) = x
    Poly%(0) = Poly%(0) + 4
    IF Poly%(0) >= 508 THEN GOSUB PrintPoly : GOTO DrawLine1
    RETURN

PrintPoly:
    CALL FRAMEPOLY(VARPTR(Poly%(0)))
InitPoly:
    Poly%(0) = 10
    Poly%(1) = 0 : Poly%(2) = 0
    Poly%(3) = BoxDensity : Poly%(4) = BoxDensity
    RETURN
```

In order to plot a Sierpinski curve using the polygon routines, then, all we have to do is to assemble an array of numbers corresponding to the co-ordinates of the curve and point the QuickDraw to it. However, there is a catch to this, as there always must be. You see, whereas the QuickDraw could theoretically handle up to sixty five thousand odd points in an element list, BASIC is a bit more restricted. It only allows for two hundred and fifty-six elements in an array, which effectively limits the size of a single polygon which one can pass to the ROM.

This isn't completely defeating, as at the termination of a polygon the Mac's "pen" is dropped right where things snuffed it and another polygon can easy start from that point. A curve made up of more than two hundred and fifty-five points... well, two hundred and forty odd, actually, allowing for the first five elements being used for the index and the size parameters... can be defined as a series of polygons, with the array plotted and trashed between each.

One can think of this array as being a stack of sorts. The index serves as a pointer into it for us. As can be seen in the DrawLine subroutine, each time a new point is calculated the index is incremented by four... or two array elements, one each for the vertical and horizontal co-ordinates. If we were to go and call FRAMEPOLY with this array as it stands it would specify a valid polygon based on the data that's been stuffed into it so far. Poly%(0) also tells us what elements should hold the *next* two co-ordinate values when they come along.

As with all stacks, there will be garbage in the array values beyond the ones pointed to by the index. This is cool, however, as neither the program nor the QuickDraw routines will look at anything that's not encompassed by the index.

Time For Curves

Using the ROM calls to do some of the hard work makes the screen images happen a lot quicker... at least until the polygon runs out of elements. If the array is less than two hundred and fifty-six bytes long we're laughing... the polygon calls will draw things a lot snappier than could be managed within the confines of BASIC. In the case of the Sierpinski curve, however, more dense curves call for multiple polygons, which negates this to some extent. There are hiatuses in the process when BASIC has to wake up and plot some more points.

It's still an improvement over doing it all in BASIC.

There is a still more powerful way to get all this together. We could POKE all the values of the Sierpinski curve into memory... using CLEAR to make some space that BASIC won't dance on... and then point the polygon routines at this. However, it's a lot more involved and means that for complex curves, which take quite a lot of time to calculate, the screen won't do anything at all for rather a long time.

As an added advantage, however, polygon routines which would have to look at the whole Sierpinski curve as a single polygon, such as FILLPOLY, can be used on this large array whereas they couldn't be on a curve spread over several BASIC arrays.

Having gotten everything together, the program itself is fairly easy to use. Once it's going, you'll be able to click the "stop" box to halt the generation of the current curve and the "next" box to get into the next generation of the curve. Be warned... densities above thirty-two produce beach sand.

Now, let's write a program to find a *use* for Sierpinski curves. Ahh... there isn't a ROM routine handy to solve that one. **CN!**

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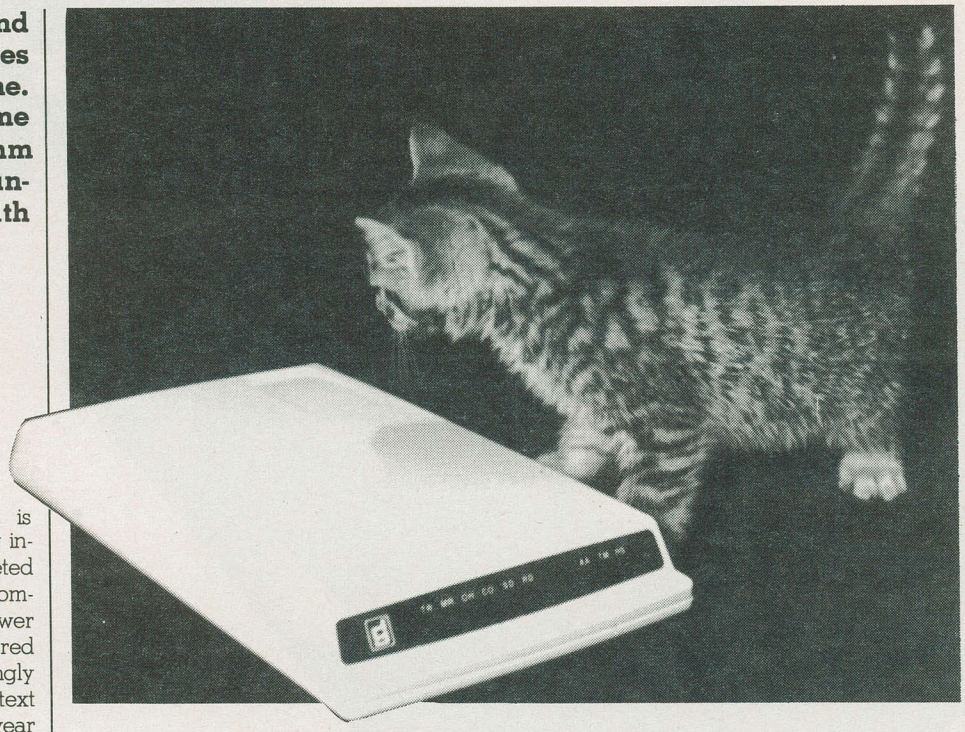
General DataComm Intelligent Modem Review

It doesn't look like a Hayes and it doesn't smell like a Hayes but it behaves a lot like one. Obviously a modem of some kind, the General DataComm box does three and twelve hundred baud communication with all the fringe benefits.

by Steve Rimmer



A twelve hundred baud modem is something one could get heavily into heaving poetry at if one poeted for such material things. While telecommunications is imminently possible at lower speeds, communications at three hundred baud is tediously, glacially, agonizingly slow. No one really wants to watch text scroll by at about the speed that a six year old child could read it.

Twelve hundred baud is a trip from the gods.

As more humans have gotten into playing with telecommunications toys and have actually expressed a willingness to pay for them, the modem trolls... that's who actually builds these things, you know... have started cranking up their wave soldering machines and doing a growing plethora of high speed modems. Unfortunately, some of the trolls are a bit evil and not all modems are created equal. Some, while technically capable of modemming... or engaging in modemification, as the case may be... are so devoid of bells, whistles or even suitable squeakers as to be almost useless in practical terms.

The vast middle ground of modems, however, are pretty slick. Complete with their own internal microprocessors, these intelligent modems are able to not only exchange data but also to interpret commands sent to them by their host computers. As such, one can control the parameters of such a modem through software, having it dial, answer the phone, change its speed and so on.

There are a number of sets of command languages for modems extant, but the most common, to be sure, is the one used by the Hayes Smartmodems. As the software that drives a modem must support its language... and as there are quite a number of Hayes modems and software packages to drive them... in choosing a modem one would reasonably want a box that uses pretty well the same dialect.

One of the more recent intelligent modems to spring forth from the valley of the trolls is the General Datacomm box. It's a moderately priced little beast and does quite a lot of stuff exceedingly well.

Three Stars

The General Datacomm intelligent modem consists of a small white box and a plug pack. It has a window up front to let you see its status lights... there are quite a few of these... and the inevitable serial connector and a pair of telephone jacks out back. This latter bit is important. There's one jack to connect the modem to the umbilicus of mother Bell and a second one into which one can plug one's now orphaned phone. This is important if you still plan to use your admittedly arcane voice telephone from time to time.

The intelligent modem will do pretty well everything one could ask of a modem and reasonably expect to see happen. It will dial the telephone in both pulse and touch tone modes. It can be made to answer the phone unattended... to wit, it will work with a bulletin board. One can change its baud rate on the fly.

It does, of course, support three hundred baud too, although only real techno-plebeians will want to use it.

On top of all this, it will actually move data, something which is frequently overlooked in adding features to a modem. In fact, in the extensive playing I did with this toy it never once hiccuped over the bytes, even at high speeds.

Actually, this is a better comment on the credibility of the modem's design than it seems. The ability of a modem to reject interference from the phone company is directly proportional to the quality.. the narrowness of the bandpass... of its filters. Some of the cheap Taiwanese modems which I've checked out were very sloppy in this respect, and could be glitched pretty easy.

"Don't breathe near the phone, son. Daddy's calling the Kinky Kumputer again..."

Given that everything else works well, the heaviest concern in using one of these things is its command structure. The language of the General Datacomm modem is a superset of the original set of commands used by the Hayes three hundred baud Smartmodem. As such, software designed to run the Hayes will work well... at least as far as I tried it... blasting away at the General Datacomm.

Among the things which did work well with this little fruit were MDM730, PC-Talk and Red Ryder for the Macintosh.

Max the Modem

The arrangement for communicating with Hayes compatible modems is a bit funky... but it works if you allow for a few provisos. It assumes that one's serial port has no fancy

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General DataComm Intelligent Modem Review

lines... like pin twenty–five phone line level control... and that absolutely everything the modem and the computer have to say to each other will have to be done by exchanging data.

The first important point is in differentiating between what we want to tell the modem to do and what we want to tell it to send. In order to make the modem accept a command it must be sent an escape sequence to take it off line and get it receptive. Unlike as in the case of most escape sequences... which contain the escape character... the escape sequence for the General Datacomm modem consists of at least one second of silence, three plus signs and another second of silence. Having checked this out, the modem will attempt to interpret the next stuff it gets as commands.

There was a message on one of our bulletin boards once which said

"one of the things that's wrong with using a smart modem on a bulletin board is that people can't exchange ideas about smart modems on it. As soon as you type +++..."

at which point the modem apparently went off line and stayed that way until the poor soul hung up.

This is a bit of a restriction in using the General Datacomm box, but it isn't a situation one can expect to run into all that often. The modem insists on that one second wait before and after the string of plus signs, so even downloading a telecommunications program which contained smart modem commands imbedded in it wouldn't be likely to take the modem off line inadvertently. If it becomes a serious hassle, one can programmatically change the character used as the escape code to something other than a plus sign.

Having taken the modem off line one has a host of things one can tell it to do. The usual form of a command is AT, for "gimme yer attention, box" followed by a letter and, in some instances, a parameter. For example,

+++ATDP423-5149

is the command to dial a number. The D means to dial and the P indicates that the modem is use pulse dialing... simulating a rotary phone... rather than touch tone dialing.

This is actually a very important feature. I was surprised to learn that our home phone will listen to either pulses or tones from a modem... although the phones are all pulse. However, most urban phone systems are set up for one or the other, depending upon which you are paying for. Cheaper modems which only do pulse dialing only particularly useful on exclusively tone lines.

There are similar sequences to do things like turning the carrier on and off, hanging up and picking up the phone, deciding how verbosely the modem will communicate with you and resetting the whole works to its powered up state. It a can also be made to answer the phone either when it rings or when it's told to do so.

In return for all this attention the modem will tell you what it thinks about the universe, karma, its phone line and itself. For example, telling it

+++ATG

will prompt it to expound

I AM A GDC MODEM

Perhaps more important than the realization that modem has a sense of its own identity is its ability to tell one useful things. If the status of the phone line changes it will send a message to say so. If the phone rings it will say RING. If the carrier vanishes into the warm blustering night it will say NO CARRIER. If you send it something incomprehensible it will say ERROR. It can also spew out CONNECT when it gets a carrier, CONNECT 1200 when it gets a high speed carrier and OK when it's satisfied and has enjoyed whatever you've told it.

There is an escape sequence, by the way, to shut these things up and have the modem return single digit result codes in their stead. However, I think that deep in its silicon brain the little guy must object to this.

Going On Line

The intelligent modem can be used with anything from a dumb terminal to a sophisticated file transfer package. If all one has is a dumb terminal the modem can still be controlled using its escape sequences as one can simply type them by hand. In pausing for one second the modem doesn't seem to care how long you actually wait... so long as it isn't less than one second.

There are a few things which are unusually nice about the General Datacomm modem... and a few gorches. For example, it has a built in speaker which allows you to listen to the telephone line. It beeps or pulses when you are dialing but shuts up as soon as the modem detects a carrier. However, if you happen to call the Vinchensi brothers House of Pizza instead of Download Heaven you'll hear voices through the speaker and know that something is amiss.

The speaker is equipped with a manual volume control and the modem can shut it off entirely through software.

On the other hand, the General Datacomm intelligent modem lacks a power switch. It stays lit as long at the plug's in the wall, and, as part of it gets rather hot users who aren't applying the modem to something that stays on all the time will probably want to shut it down when it isn't in use. Unfortunately, this involves unplugging either the power pack or the DIN connected at the back of the modem.

Finally, one of the commands which probably should have been included in the modem's repertoire is AT?, which prints up a menu of the thing's commands on an Anchor smart modem. This is extremely handy if one is going to use the thing under a simple terminal program as it saves having to check out the manual every time one wants to tell the modem to do something.

The intelligent modem comes with a well done manual divided into sections one does and doesn't have to read... they're labeled that way. It assumes that most heads won't read anything more than they have to before plugging the box in and toodling away. However, all the important stuff lies in appendices at the back, waiting for when the glow wears off.

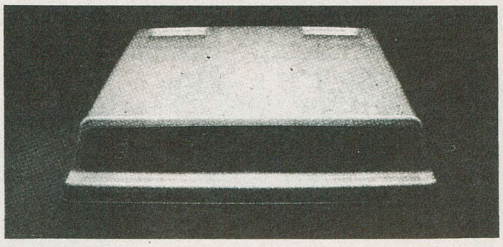
I checked out a number of intelligent modems in looking for one to give away in the contest elsewhere in this issue. The General Datacomm intelligent modem was the best of the lot, both in terms of actually working well and being cost effective. While not cheap in the way that those fifty–nine dollar acoustic modems are, it's a very good value for a high speed direct connect modem with all of its internal dancing.

If you don't win the contest you may want to consider actually buying one. **CN!**

The First Computing Now! Giveaway.

(win a GDC 300/1200 baud modem)

We thought of giving away Computing Now!'s . . . but just as we were getting the forklift warmed up the lads at General Datacomm very kindly offered us what turned out to be one of the nicest modems we'd ever seen. Far from being just any old box that beeps when you forget to unplug it, this little guy is a twelve hundred baud intelligent modem . . . as checked out elsewhere in this magazine. Among its soaring attributes are:



- **300 and 1200 baud operation.**
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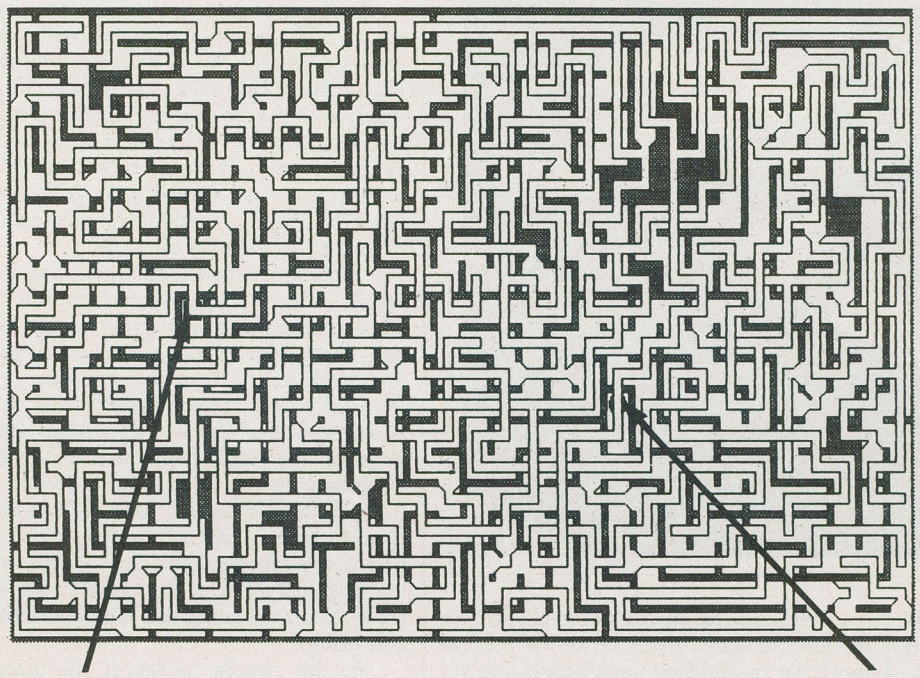
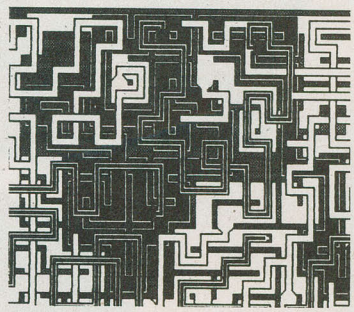
- **High class styrofoam packing box.**



END **START**



A fragment of a similar maze with the solution.

Through the generosity of General Datacomm we have one of these unspeakably fine modems and very soon it could be yours. Because it's summer and all our cars have stopped rusting we're going to give it away. All you have to do to be the recipient of this splendid bit of altruism is to manage to be the first human to have his or her entry drawn from our box of entries and have that entry bear the correct answer to our skill testing question.

Thought you'd never ask. The skill testing question is this maze. We all did these things when we were kids but after a while they tended to lose their appeal as they were too simple. This one's a bit harder than most . . . it's been computer generated.

All you have to do is to move from the start to the finish. You can go under any of the paths that cross your course . . . the maze can be up to three levels deep in places. The only actual blocks are the obvious ends of passageways and the shaded bits. The maze is soluble . . . it just might take you a while.

The example fragment here should show you the form.

Please . . . only send us one entry. If it's your destiny to win you will . . . multiple submissions will be disqualified by a genuine Alonzo Brothers paper shredder which greatly enjoys its work.

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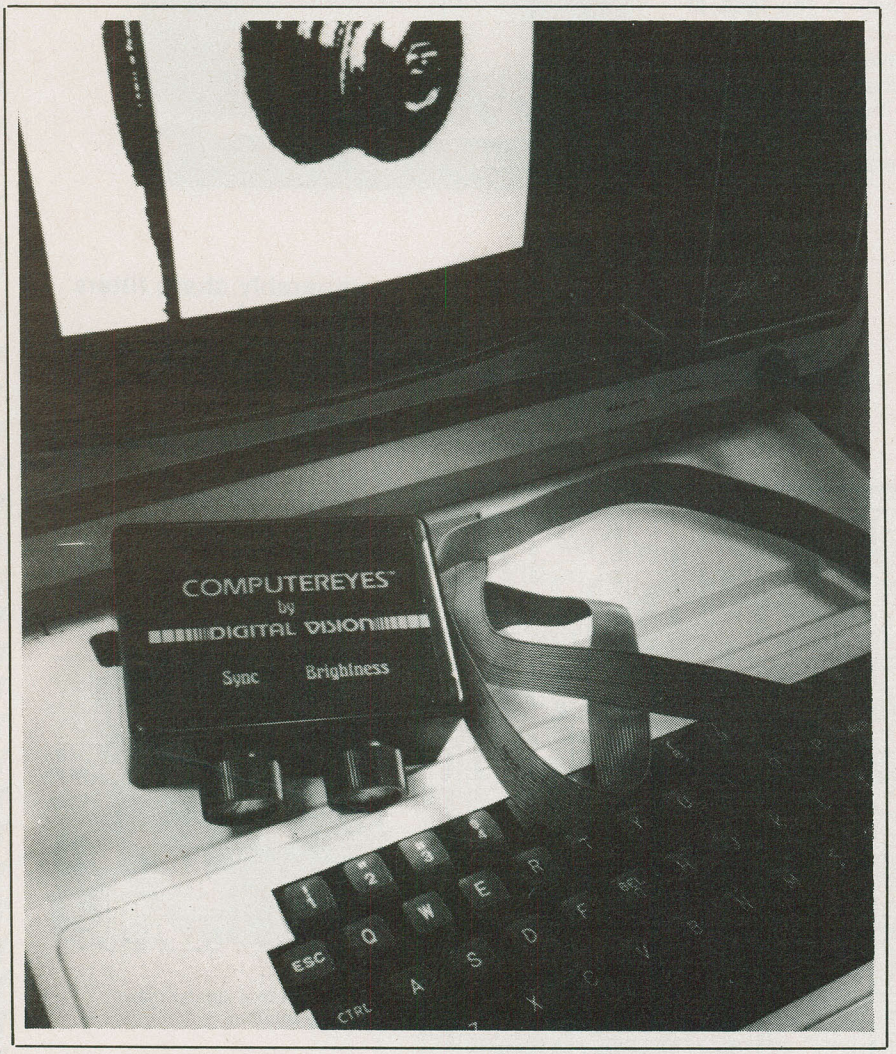
Computer Eyes Review



This little box connects your computer to a television camera. More to the point, having thus been connected, your Apple, Commodore 64 or Atari will be able to create high resolution images from whatever it sees. With that and a drum machine you could build yourself a rock star.

by Steve Rimmer

The best peripherals are by no means the most practical or useful ones. In fact, I think it's probably fair to say that the really superb ones wouldn't do a thing for the megasuits and other business computer types at all.

The boxes and cards that really do it for me are the ones that don't just make Lotus run faster or interface the Macintosh to yet another type of daisy wheel printer. The really slick toys are the things that you can lay a bit of imagination on and get into new areas of computer applications.

Computer Eyes, a new low cost video frame grabber from Digital Vision, just seems to scream for a bit of application. It's one of those things that you know is going to be a party five minutes after you unwrap it.

The Eyes Have It

The Computer Eyes system is available for a number of machines... I got Apple and Commodore 64 versions to play with. While they each come with different software and interfaces... you'd expect that... they all work about the same.

I had an extensive play with the Apple version. Aside from the box itself and a disk to make it do its thing, the folks from Eyes sent along some driving software for various Apple graphics systems, such as the Koala pad.

Using Computer Eyes on the Apple is even easier than getting most simple peripherals happening on a fruit. There isn't even an interface card to slam in a slot. The cable emanating from the small plastic box that hides the thing's internals plugs into the joystick port. There's a single RCA jack on it that accepts an input from a television camera or other source of video. Two knobs set up its internal threshold and sync.

Booting up the systems's canned demonstration software... or the Computer Eyes *executive*, as the manual calls it... can have one grabbing frames in a few seconds.

In its simplest form, the Computer Eyes system takes a video signal from whatever is plugged into its jack and separates it into the fifty-three thousand or so pixels which make up an Apple high resolution image. Allowing that the thing has a *threshold* of image intensity... a certain amount of video amplitude it can regard as a cross over point... it decides whether each pixel should be regarded as being on or off.

Digitizing a video frame this way produces a very high contrast picture of whatever the system sees. It also manages to do a very fast grab... the picture is captured and displayed in about two seconds.

The important thing about this process, however, is that the way the image finally looks on the Apple's screen is dependant upon how the threshold is set. If it's low, so that only a bit of light is needed to cause a pixel to be on, most of the screen will be bright for a given image. If it's set high, only the brightest areas in the video image will show up on the computer, with everything else black.

In this simple model of the beast's operation the threshold is set at one place, in this case by the use of one of the large knobs on the plastic box. However, the circuitry of the little guy allows the computer to adjust this setting too.

A picture with a grey scale... that is, any normal video image as spewed forth by a more or less working camera... can actually be thought of as being a number of layers of images which are solely black and white... each one having a different threshold. To look at this another way, the digitizer could generate an image with a grey scale of sorts by superimposing a number of pictures, each one with the threshold level changed a bit.

The Computer Eyes system can get this together in its more sophisticated modes, allowing for the generation of four and eight

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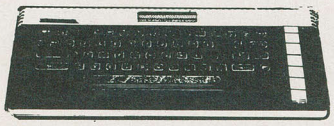

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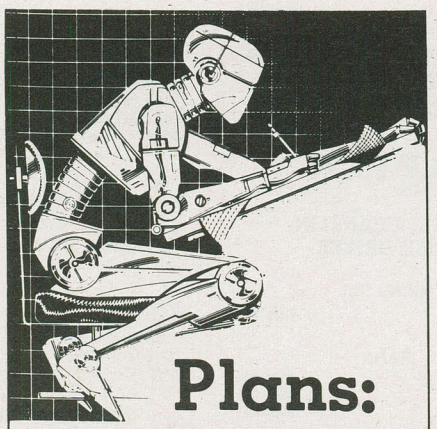
Computer Eyes Review

level pictures. These take a bit longer than single scan frame grabs, but they can look really profound. The grey shades are composed of bits dithered into colours.

Doorknobs

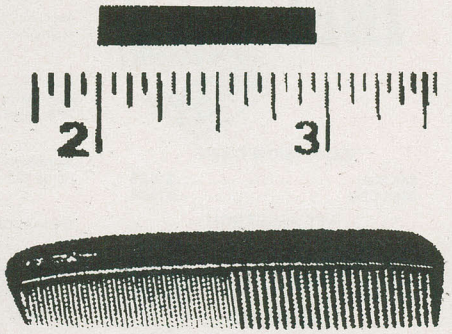
There are a number of applications for Computer Eyes which call for nothing more than getting it to create high resolution pictures from a video source and stash them on a disk... something the executive is quite capable of taking care of. However, quite a number of its possibilities lie in having it interface to other programs. As it happens, this is splendidly simple as the driver software has been designed to be used independently.

There's a binary file called CEDRIVER which one BLOADs into memory. Thereafter, a CALL 32768 or JSR $8000 will cause the digitizer to scoop up one frame from whatever is sending it pictures and stash it in page one of the high resolution display. If one has POKEd the appropriate soft switches or laid an HGR on the fruit prior to this the image will be visible.



Plans:

Product:	**Computer Eyes**
Description:	**Video acquisition system**
Computers:	**Apple][series, Commodore 64**
Optional Equipment:	**Dot matrix printer, any video output**
Inputs:	**VCR, video camera, TV receivers, other computers**
Manufacturer:	**Digital Vision**
Distributor:	**Phase 4 Distributors Incorporated**
Suggested Retail:	**$199.95; system also available with B/W video camera**



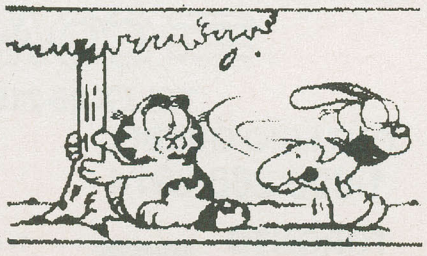
There are similar calls to do a four level scan, a sync display to help one set up the system and calls to pack and unpack images to make them smaller for archival stashing on a disk.

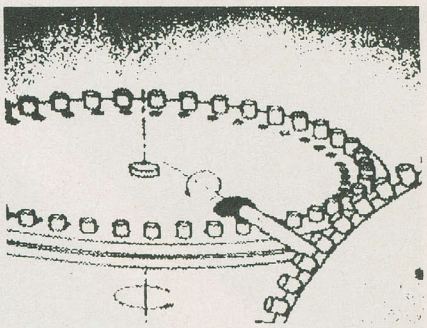
Needless to say, the disk that comes with the system is not copy protected, and one can make all the backups of it one needs. However, beyond this the manufacturer will provide one with a commented source file for the driver for a nominal price should one want to meddle with its works.

The system is really easy to use, although it takes a while to make it do exactly what you want it to. Setting the threshold level properly for a single scanned image takes a bit of experimentation... it's somewhat harder for the multiple scans that do grey scales as the longer scans make it hard to see what one has wrought. In addition, taking multiple scan pictures of things that aren't perfectly still can produce some really strange results.

Just about anything seems to work as a video source for the Computer Eyes box. Among the signals I zapped into it were emanations from several very old and skuzzy black and white television cameras, one new... and rented... colour television camera, a number of video tape recorders, another Apple... a bit pointless, I know... and this really weird test pattern generator from the stone age. It digitized everything with effortless grace.

Plugging it into the a video signal coming directly from the sky... broadcast television... was a bit less productive as the stuff





moved around before the box could do its thing. Some of the resulting pictures got pretty strange.

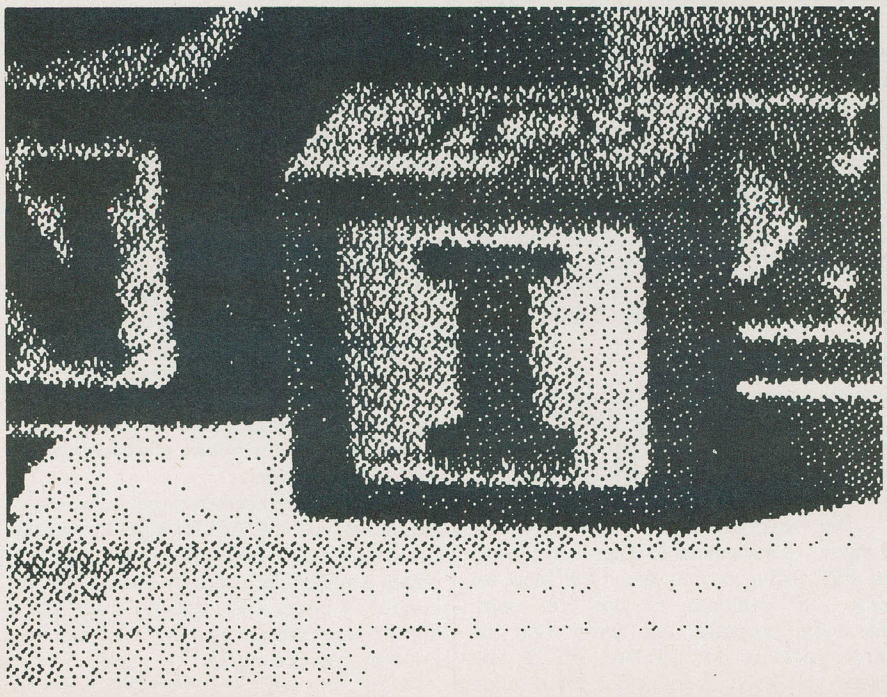
Good Stuff

Especially considering what it costs, the Computer Eyes system is one of the most impressive new wombats of the last milli-eon. Its software and general operation seems to be flawless, its construction is solid, its manual is lucid and the support Digital Vision seems to be up for providing for it is impeccable.

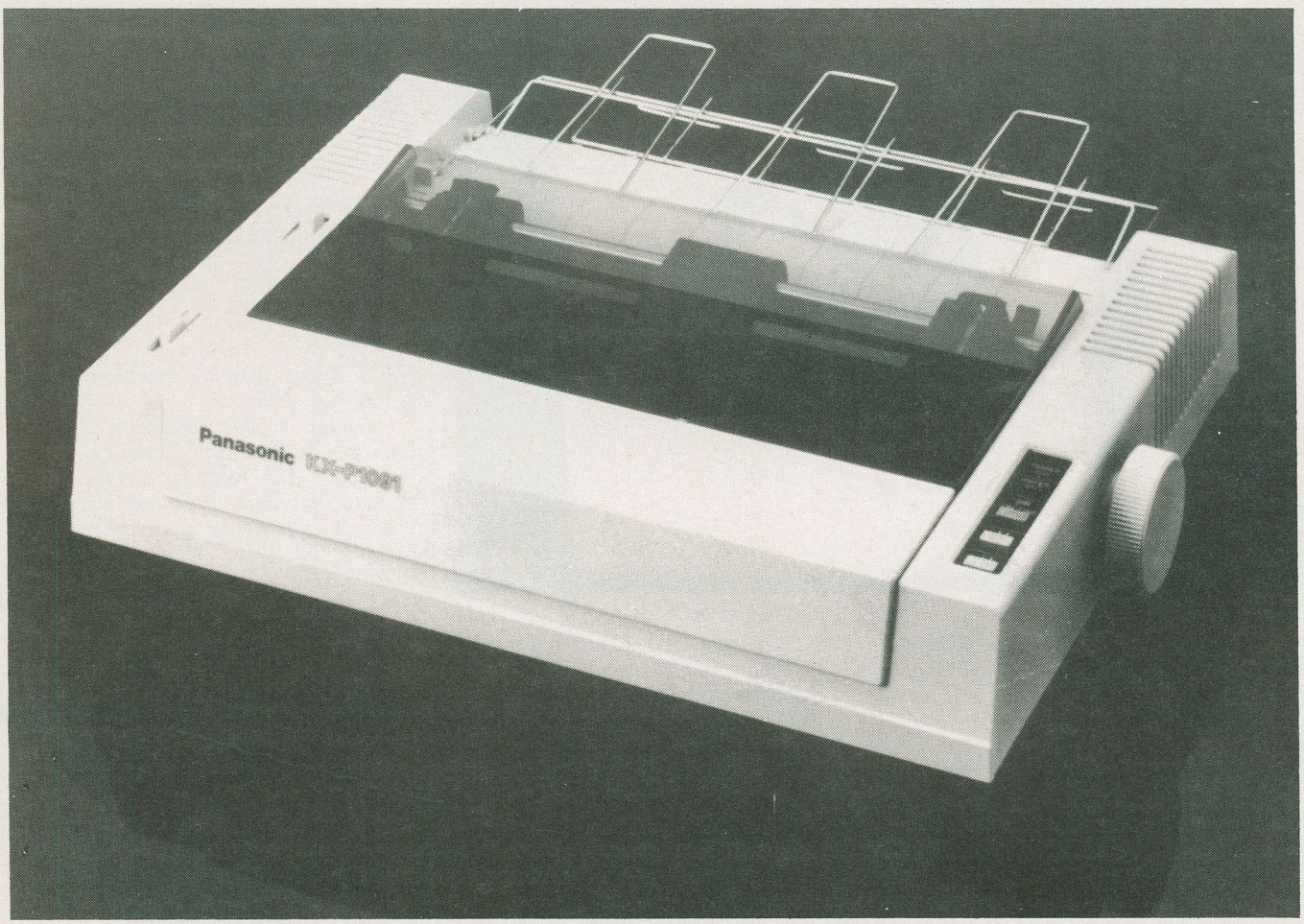
The applications for the system are limited only by your own head and the number of patch cords you have. One can, of course, get images into the Apple for graphic things. However, sufficiently clever hardware and software might have it scan text, check out machine parts or keep an eye on things when the security guards are out playing poker.

On top of all this splendor, Computer Eyes has a Canadian distributor, so you won't even have to plead with the boys at customs. Interested computers can contact Phase 4 Distributors Incorporated, 7157 Fisher Road S.E., Calgary, Alberta T2H 0W5 1-416-252-0911.

Your computer will see for miles. **CN!**



Panasonic 1091 Printer Review



Perhaps the perfect printer to plug into a PC if you can't spring for an Epson and recoil from the thought of a Gemini, this new box from Panasonic is so compatible as to practically lunge out of its packing carton and embrace your monitor.

by Frank Lenk

An ideal printer has to fulfill several somewhat conflicting conditions. First of all, it has to be cheap. However, it should also produce good quality print... preferably both draft and letter quality... at a reasonable speed. Finally, of course, it should run at a moderate decibel level lest the government complain about the disruption of its seismographs.

The extremes of the scale of printers are quite clearly defined. At the low end there lies the inevitable Gemini Star 10X. At the opposite end rests the definitive Epson FX. The lasers, inkjets and twenty-four pin true letter quality dot matrix printers can remain the province of the independently wealthy for the sake of this argument.

There is a new middle ground developing between these two sorts of machine. The Panasonic KX P1091 is a good example of this.. a printer for people with a bit more than three hundred and fifty dollars.

Panic Stricken

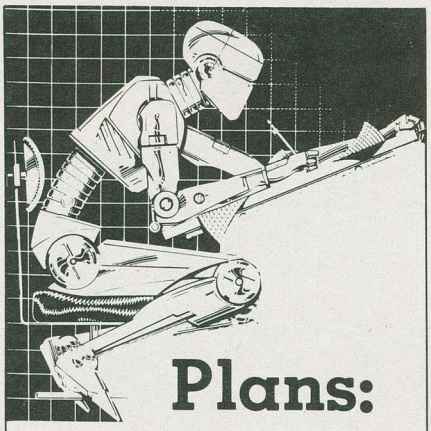
The Panasonic is the first third party printer to mate perfectly with the IBM PC. After weeks of steady use, I can say that it handles everything the PC can send to it... and all but perfectly emulates an Epson.

The Panasonic character sets... all four of them... are identical to those specified in the IBM technical manuals. One must set some DIP switches to use the extra characters properly, and even then the printer defaults to standard ASCII text unless you send it the right initialization code. This is actually an advantage, since it makes the printer act normally except when you know you want to access its extra features. The DIP setting is kind of a breeze, with all the switches being visible in a little hole down under the print head.

Once the graphics characters are selected, one can dump any of those fancy looking windowing screens with reasonable fidelity. There are two limitations to this, common to both the IBM dot matrix and the Panasonic. First, neither printer offers any double line characters... replacing them with a second set of single line horizontal, vertical and corner elements. As a result, those fiddly little windows always show up with single borders.

The second problem is that some of the characters with low ASCII values are simply not printable. These characters borrow codes traditionally used for things like the control G beep. They can be... and often are... poked directly onto the video display, but they can't be printed.

Dumping vertical screen lines shows a



Plans:

Printer:	**Panasonic KX P1091**
Print Matrix:	**7 x 9 pins**
Manufacturer:	**Panasonic**
Distributor:	**Panasonic Office Automation, 5770 Ambler Drive, Mississauga, Ontario L4W 2T3 (416) 624-5010**
Suggested Retail:	**$549.00**

slight wobble from line to line... kind of a mild square wave effect. This can be eliminated by putting the printer in its unidirectional print mode.

The only Epson incompatibility I've seen so far on the Panasonic was related to printing out Volkswriter files. For some reason the Panasonic printed a single graphic character at the top of each file... no doubt a control code that it somehow felt was printable even though the Epson apparently didn't. WordStar files printed perfectly... subject to the notorious limitations of WordStar itself.

Friends

Compared to the Gemini, the Panasonic has improved the question of compatibility in at least one way. It uses exactly the same line feeds expected by PC DOS commands such as GRAPHICS.COM. This means that graphics dumps automatically come out without those annoying gaps.

One of the nicest features of the Panasonic 1091 is a little switch on the left top panel. This provides a selection of three print modes, to wit, standard program quality, near letter quality and proportionally spaced type. The standard mode is just what the name implies. It makes the unit act just like an older Epson MX or the Gemini 10X.

Near letter quality is by far the most amazing advantage of the new generation of dot matrix printers. Using two passes of the print head with a fractional line feed between them, this generates print which is about as readable as that of a decent manual typewriter. You can still tell it's dot matrix if you look closely, but it's good enough to satisfy all but a few of the crustier nitpickers.

The proportional mode is a mystery to me. It certainly does look proportional, but I really can't figure out what it's for. Proportional print is not available in the near letter quality mode, and it's not really any more readable than the standard Pica and Elite fonts.

The selector switch itself is a handy idea. It lets you format a file for draft printout, then do up near letter quality version without re-editing the file itself. Except in the normal program mode, the switch setting overrides any contrary codes downloaded from the computer.

The print quality in the standard fonts is measurably superior to that of the Gemini, and only subtly inferior to the Epson's. All the usual variations are available, such as emphasized, double width, super and subscripts.

One nice thing about the Gemini was its ability to feed on standard, inexpensive typewriter ribbons. The Panasonic likes to chew up its own special breed of cartridges... at twelve to seventeen bucks a pop, depending on where you pop for them. Fortunately, these cartridge ribbons seem to last pretty well, though perhaps not in proportion to their price. There's a little hole you can punch to enable a reserve ink reservoir, giving aging ribbons a new lease on life. The cartridges are easy to snap in and out, making it attractive to keep a fresh one around just for the odd bit of high quality printing.

Overall the Panasonic printer is just as well packaged as the Epson... although the latter is probably rather more rugged... a consideration if it's going to be kicked around the office. The Panasonic is much better put together than the Gemini. Actually, it makes the Gemini look like a bit of a beast. The Panasonic gains a lot of appearance points for its built in low profile tractors, which contrast nicely with the Gemini's bulky removable tractor feed.

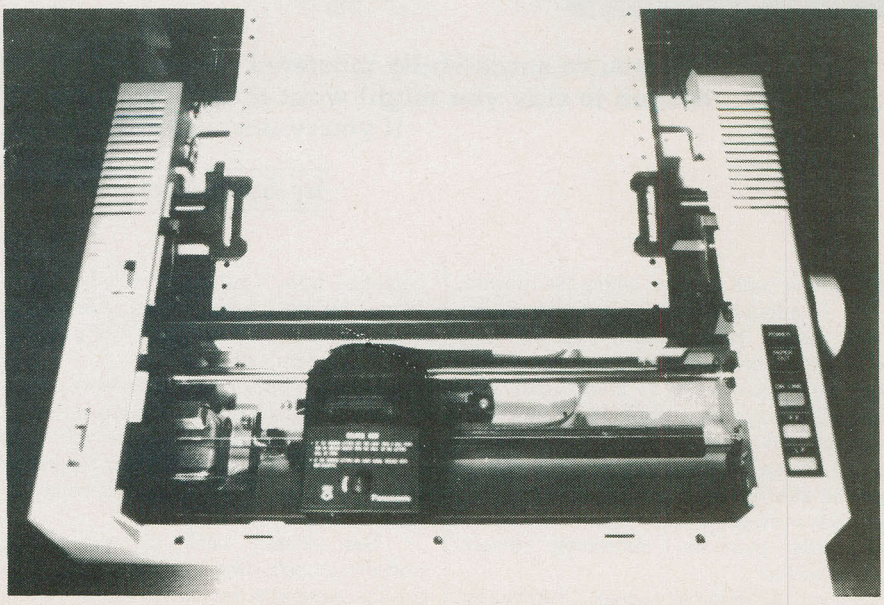
The Panasonic also runs noticeably faster and quieter than the Gemini.

Printer's Devils

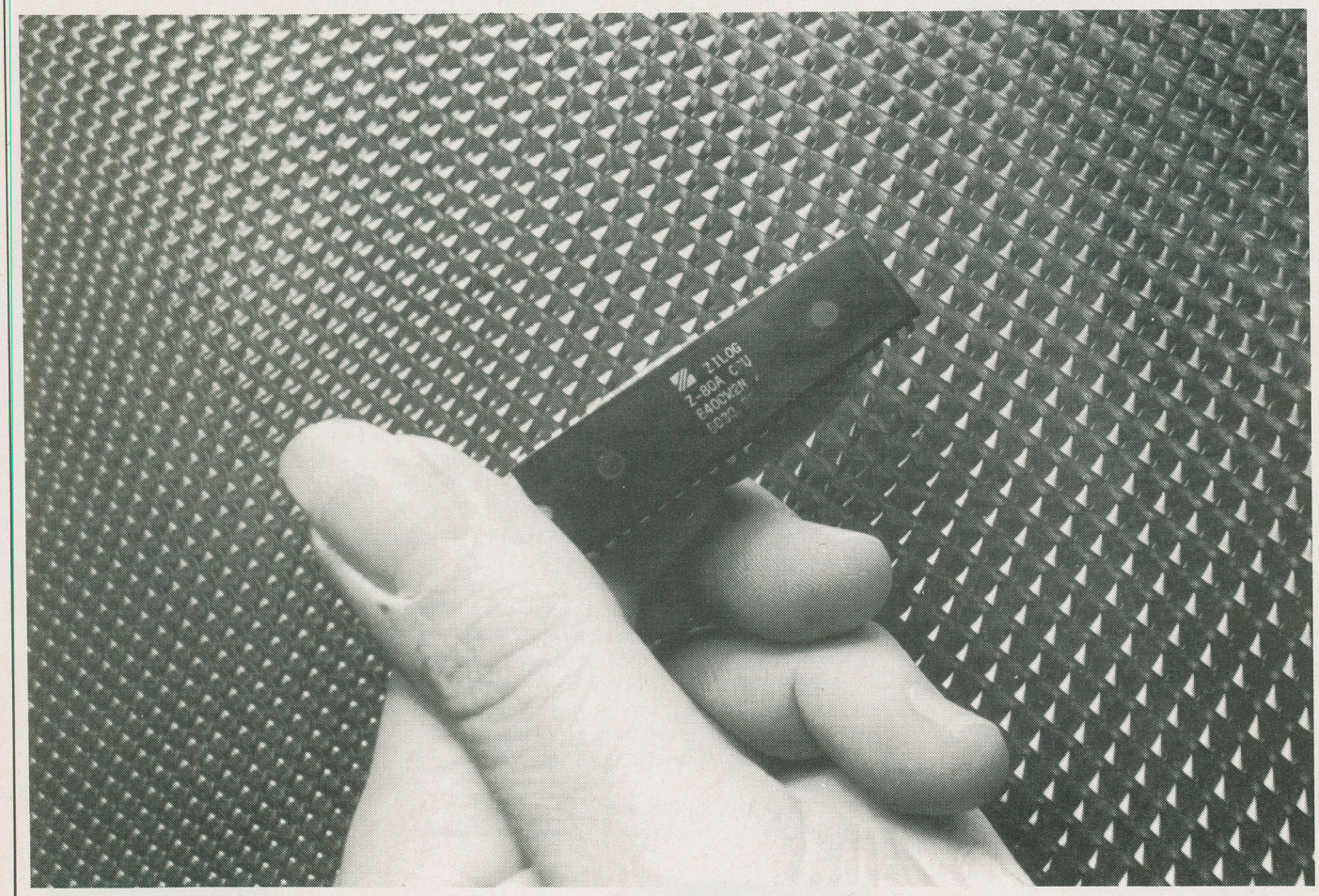
The Panasonic is a very good choice if one wants an intermediately priced printer to plug into an IBM PC or something compatible. The same basic machine is already available under several brand names... as with so much Japanese hardware, the guts are all made by some anonymous third party.

If you're into continuous output on a fifty hour week schedule, you'd probably be a bit daring to consider anything but an authentic Epson. On the other hand, if all you're doing is churning out the odd BASIC program listing even a Gemini will suffice.

However, if you are that new breed of independent, free thinking professional... if you embody that certain combination of intelligence and taste... if you routinely generate finely crafted prose of immense grace and beauty... in short, if you're anything like *me*, you'll go out and get yourself one of these hot 1091's. **CN!**



Sloth on a Z80



If you've successfully mastered assembly language and want a new dragon to slay you might want to bare your sword to a sloth . . . but only if you're unspeakably brave.

by Steve Rimmer

There was a time when the phrase "computer hacker" didn't mean some slightly bald thirteen year old kid who liked to crack software and break into mainframe computers to start world war three. It used to be a noble title, signifying someone who had mastered the intricacies of technology and was now up for advancing the knowledge of humanity by finding new ways to make it tick. I mean, those guys were real pioneers... extremely decent heads and all.

They still exist, of course... they're just nameless now. You might well be one of them... feeling like you've been robbed of a great heritage. I think God was a hacker too. Just look at this place.

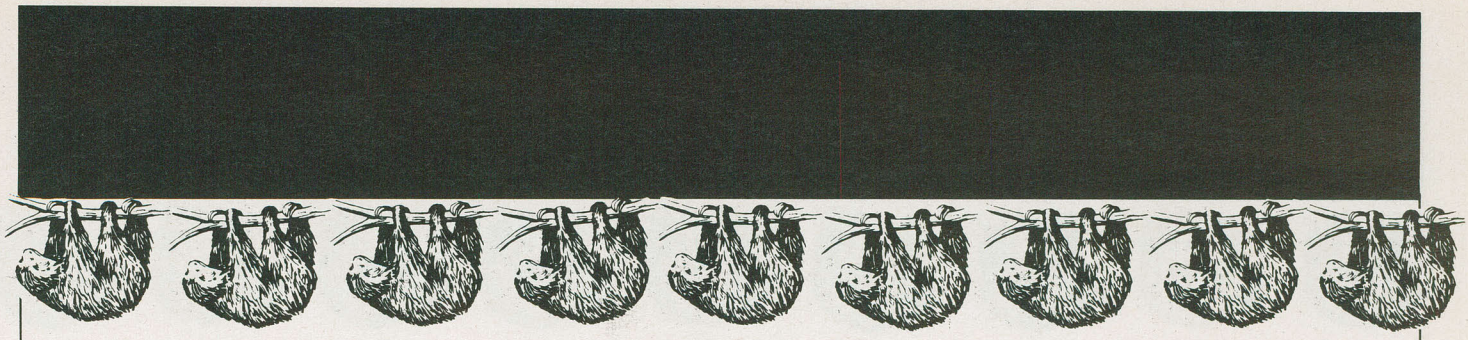
Software hacking is moderately easy to get into, and not too harrowing because you can't do any permanent harm to your computer so long as you remember where the power switch is. Hacking hardware is a bit trickier.

The ultimate hack, however, is in designing one's own hardware. This is the trip that separates the men from the accountants and really makes computers something to live in mortal dread of. If you can hack with the chips you're a wizard of the first circle.

In this feature we're going to look at a bit of the forbidden magic. We're going to check out the working of the Z80 microprocessor at a practical hardware level, with the intent of doing something with it later on.

Wire That Wand

The Z80 might seem a bit arcane at the mo-



ment when compared with the 8088 or the 68000, but, for many small applications there is no better choice amongst commonly available microprocessors. It's cheap, plentiful, graced with first rate development tools and easy to to work with... well, somewhat easy, anyway.

Having gotten though this article and a few that will appear in upcoming editions of Computing Now! you will be able to take a Z80 and a small bag of other parts and assemble for yourself an authentic Sloth IV. You probably don't know that you desperately need a Sloth IV just yet... probably because you aren't entirely sure what it is. In fact, a Sloth IV is a small one board dedicated computer.

When one thinks of a computer one normally thinks of a thing with a keyboard and a screen, disk drives and so on. A dedicated computer, on the other hand, is much simpler. It has a processor, usually some ROM and some RAM, and some sort of I/O. Its program lives in firmware... it's set up to do a single task.

Dedicated computers are usually found doing the things that much more involved electronic or mechanical contraptions might have handled previously. One sees them in microwave ovens, furnace controls and so on.

The Sloth IV computer consists of a processor, two K of RAM, two K of ROM, three counter timers... we'll get to that... two I/O ports... and that... a six digit LED display and a speaker. It has no intelligence at all, save for what you write for it. It can be made into anything.

The Sloth is a neat little beast because you can dream up things to do with it. It's also a good way to explore how microcomputer hardware goes about what it does.

The circuit diagram here is for most of the Sloth. In its hardware incarnation it has its LED display on a separate board... we'll eye that another time. This is the basic implementation of a Z80... irrespective of what it's eventually going to be used for.

There are two things one must bear in mind when one is designing an bit of hardware. The first is that it must eventually work... at least, it should. The second is that it must be made up of bits that are obtainable. The latter is the trickiest of the two.

The major elements of this little guy are pretty disparate. Most microprocessors are supported by chips which interface easily to them. I haven't used the Z80's support chips here because, while they would have made the design a bit less involved, you can't get them very easily right now.

On the other hand, the parts that I *have* used are pretty common because they're used in pretty common machines. The Z80 is found on the Apple CP/M soft card. The 8255 and 8253 are part of the IBM PC. The 2716 EPROM is found in almost everything and 6116's are used in lots of small custom terminals and peripherals.

Before we get into the actual nasty bits, it might be worth while seeing what everything in this circuit does. The microprocessor, of course, microprocesses... whatever that means... so we won't worry about it. The 8255 allows the programs which will eventually run on the Sloth to communicate with the outside world. It has three eight bit ports... of which one is tied up by the system... which can input or output characters. Alternately, we might have a port check out whether some switches are closed to have the computer read a keyboard.

The 8253 is a bit more mysterious. It consists of three counter timers. Each of these can have several uses, but the most common is to have one take a train of pulses and divide it by some number which the computer supplies. For example, one could take the computer's clock and divide it down to an audible frequency to drive the speaker.

The RAM is the computer's scratch pad memory. The ROM holds whatever program we want to run on the thing. The programs are written in machine code... presumably on another machine... and blown into EPROMs which can then be stuck into the ROM socket on the board.

Software development for the Sloth is a bit tedious when compared to writing code in BASIC. In practice, I developed the programs for it by writing them in WordStar under Apple CP/M, assembling them with a CP/M assembler and blowing them into EPROMs with an Exceltronix Apple PROM blaster and a custom written CP/M based driver. The driver will be presented in a future issue should you want to use the same arrangement.

Bits

The first thing that tends to freak people about microprocessors is the address bus. It's probably pretty clear that the Z80 can read the information in a given byte of memory by putting the address of the byte on its bus and doing a read. The data in the byte will then turn up on the data bus.

Understanding how a block of RAM comes to be at a given address is a bit livelier. This is largely because one tends to try to work it out in decimal rather than in binary, the way the computer likes to think.

There are sixteen lines in the address bus, labeled A0 through A15. The latter is the most significant. There's a trick to understanding what they do. Each line is a flag, and each flag divides the total amount of memory it's responsible for in half. If the flag is set... that is, if the line is high... the memory in question is the upper half. If it's unset... the line is low... it's the lower half.

If line A15 is set to one, then, we can narrow down the memory that the processor is interested in to being somewhere in the upper thirty-two K of RAM. If the A14 line is set we can say that it's in the upper half of the upper half, or the upper sixteen K. If the A13 is not set, that is, if it's low, the memory we're interested in is in the lower half of the upper half of the upper half... or, in more comprehensible terms, in the eight K block which second down from the top of memory.

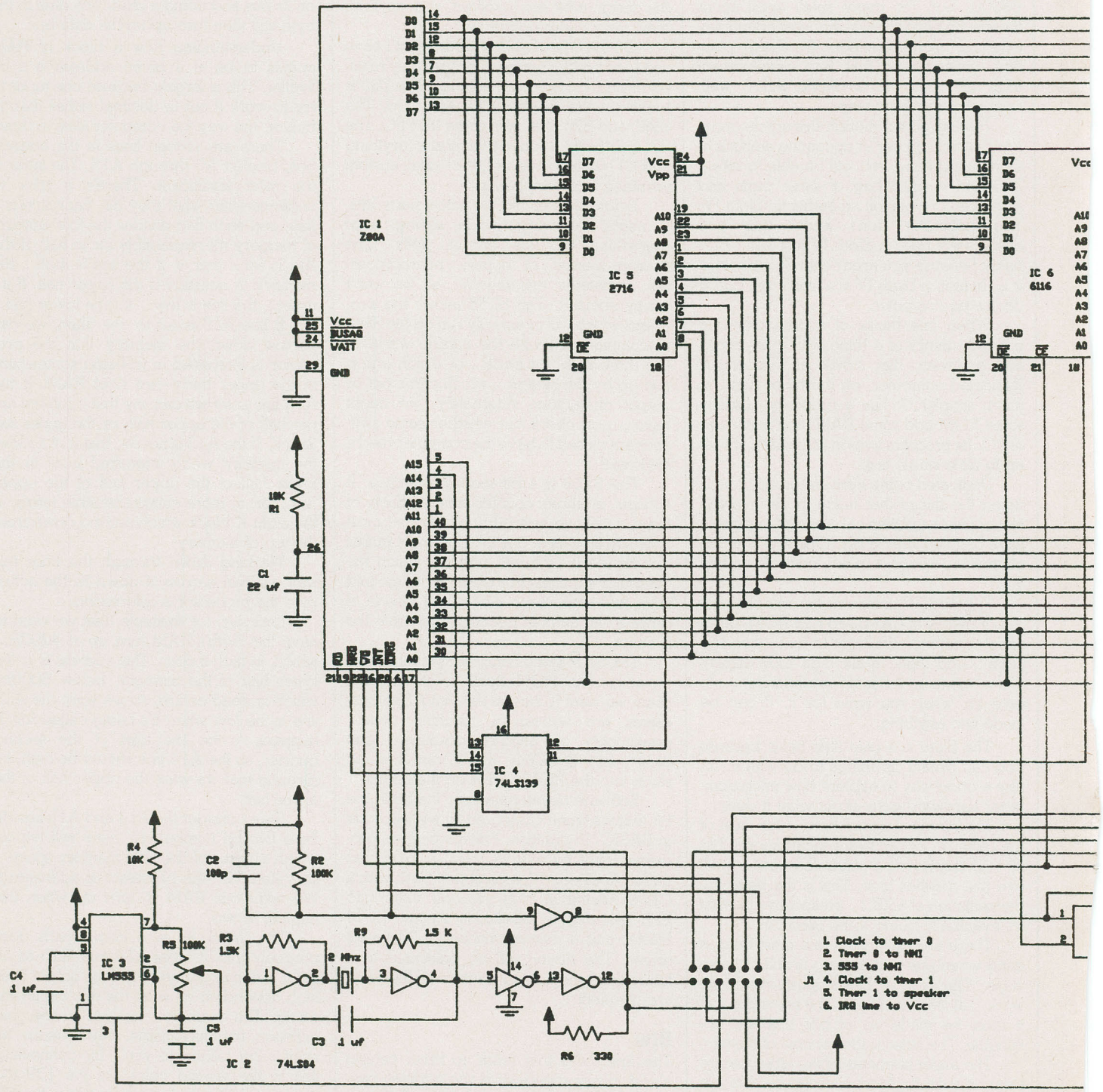
Working down through the lines this way we can narrow it down to the actual byte the processor is addressing.

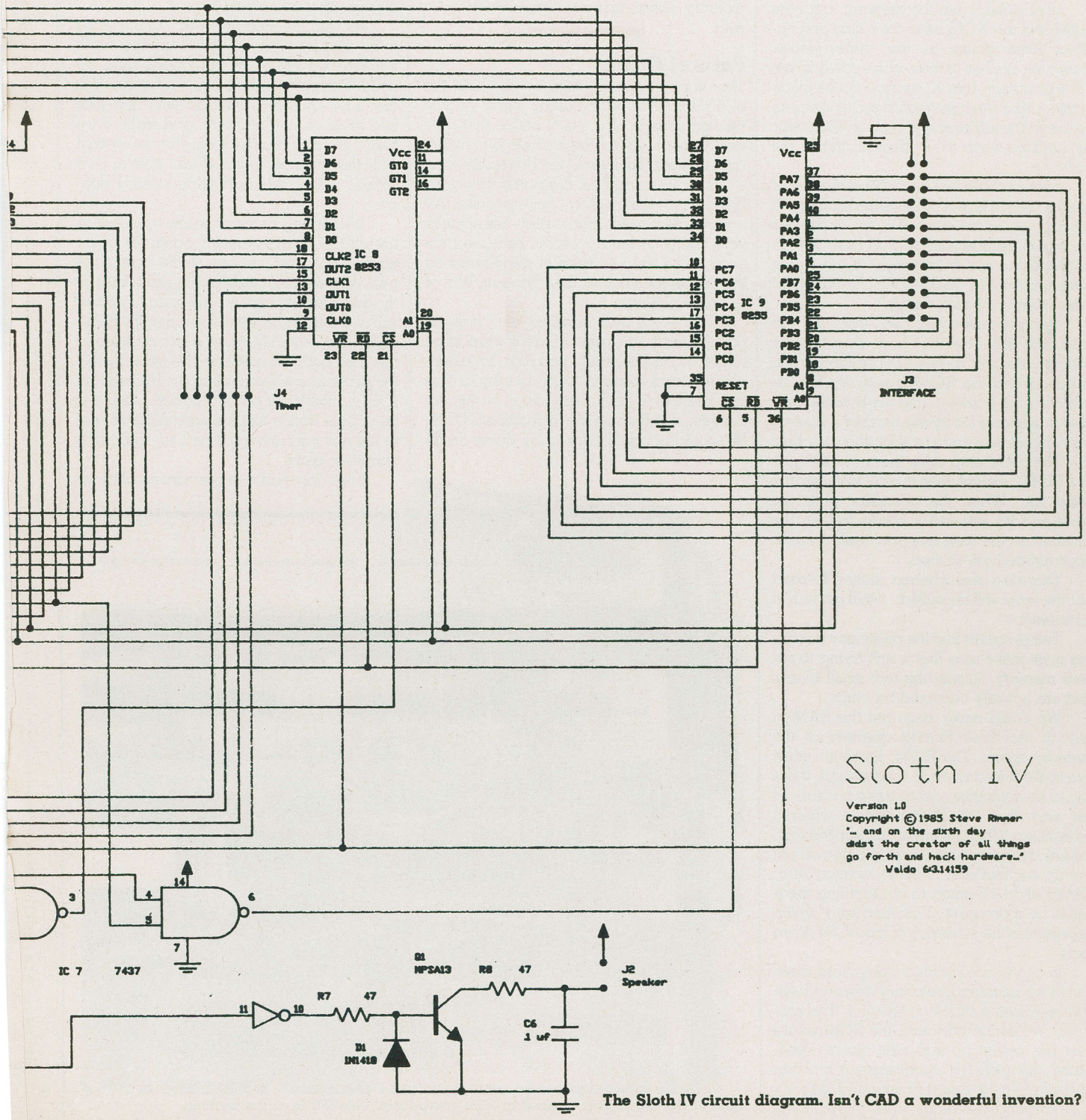
Let's say, for example, that we want to have the Sloth's RAM turn up at 4000H... which, in fact, it does. This address is in the lower half of the memory, below 8000H, which is dead centre, so we want the A15 line to be low when it's being called for. It happens to be the start of the second quarter, so the A14 line should be high, indicating that we want the upper half of the lower half.

If we consider the A14 and A15 lines to be a two bit number, its value will tell us which quarter of the total memory space... sixty-four K... the processor is addressing. We want our RAM to turn up when this number is two.

The 74LS139 is a chip which does precisely this. It takes A14 and A15 as an input and makes one of its four output lines high depending on what the two inputs are doing. The memory chip has a line, pin eighteen, the chip enable, which means "all right... I'm talking to you". By connecting this to the second output of the 139 the memory will only be active when the second quarter of the address space is being

Sloth on a Z80





The Sloth IV circuit diagram. Isn't CAD a wonderful invention?

Sloth on a Z80

looked at by the processor.

If you check out the diagram, both the RAM and the ROM have their data and address lines going to the same places. However, neither of these chips can address the whole sixty-four K, so they can be made active, using their pin eighteens, at different places in the address space of the processor by hooking each to a different line of the 139.

Each of these two chips has a quarter of the memory space to itself at the moment. If we had, say, eight devices to put on the bus we would decode lines A15, A14 and A13, to carve the space into eight. As it is, we have two unused quarters which could hold other memory based things.

The processor has two lines, RD, or read, and WR, or write. These communicate with the memory devices. When the RD line is pulled *and* the ROM is selected by the 139 the chip knows to find the byte the processor is asking for by the number it sees on the address bus and put it on the data bus.

The RAM chip does the same thing as the ROM, except that it also watches the write line. When the processor pulls the write and it's selected it knows to take the number on the data bus and stash it in the appropriate byte of itself.

There is a case wherein neither the read not the write will be pulled... we'll get to it in a moment.

The program that the processor is running must make sure that it isn't trying to access memory outside the two small blocks that are actually occupied by chips.

We could easily have put the RAM in any of the three highest quarters of the memory space. The ROM, however, must live in the lowest quarter... or, at least, there has to be something down there because of the way that the Z80 behaves when it powers up. When power is first applied to it, the little time constant circuit hanging off pin twenty-six makes it jump to location zero. Obviously if it's going to do anything there has to be a program at location zero, which necessitates the existence of the ROM down there.

In more complicated computers there would be memory stretching down to location zero with a ROM on top of it. The processor would jump to zero, the ROM would start the system up and then disable itself, letting the memory underneath it function normally. This is called phantom ROM... it's a bit beyond the Sloth, and, more to the point, quite unnecessary as we have more memory space than we know what to do with.

Ports of Call

The other two large chips in the Sloth, the 8255 and the 8253, aren't hung on the memory bus at all... you'll notice that they don't have much of the address bus extending to them. These are port driven devices.

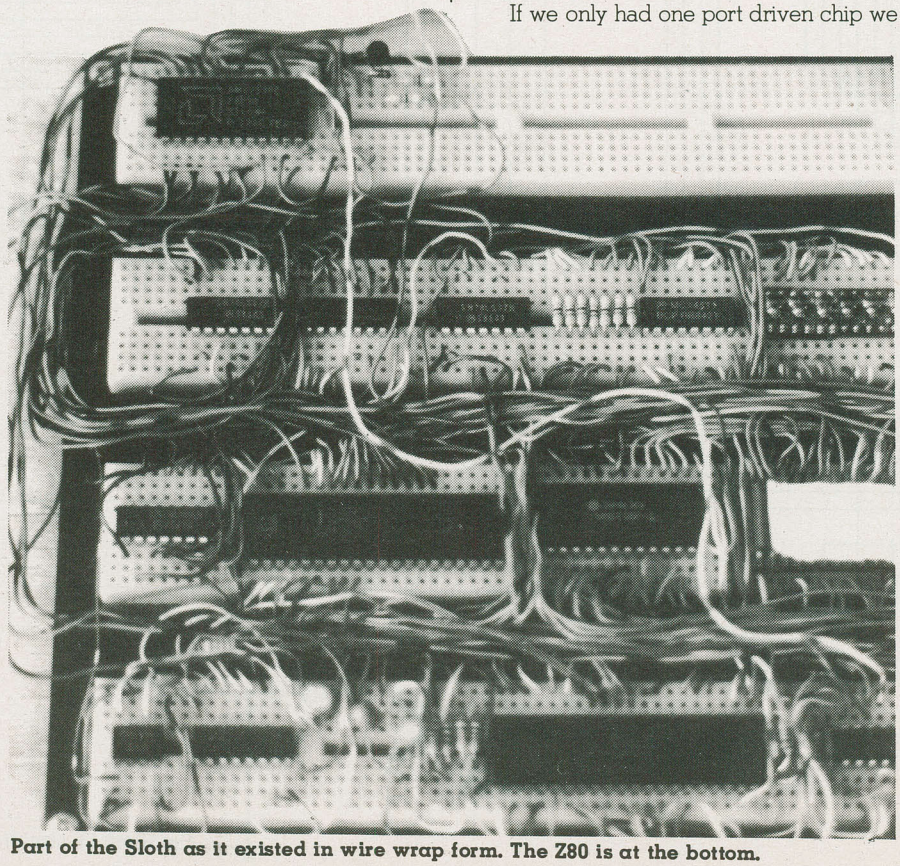
The Z80... and the 8088 that drives the IBM PC, for that matter... has a peculiar I/O arrangement called ports. Ports are actually very useful in large systems because they allow us to hang all sorts of peripherals on the processor's bus without tying up any of its address space.

There are two hundred and fifty-six possible port addresses. If there were to be something connected to port four, for example, we would send data out to it by having the processor stash the data in its accumulator and doing the instruction OUT 4. We could get data back in by doing an IN 4... and the data would show up in the the aforementioned accumulator.

As with the memory, we're going to be a bit sloppy with the ports in the Sloth because we have far more ports than we need. The ports of the 8253... it has several, one after another... will start with port four and those of the 8255 with port eight. If we had a third port driven chip in the system with this arrangement it would start at port sixteen, which where it starts looking sloppy.

When the processor wants to tell all its friends that it's up for moving data through a port, it puts the number of the port... the port address... on the lowest eight lines of the address bus. I know... the memory chips will see this and should think they're being called for. Actually, they won't because in this case both the read and the write lines of the processor will stay sleeping. Instead, the IORQ... the input output request... line will be pulled. Notice that this line makes its way to the two port driven chips... er, through a couple of gates.

If we only had one port driven chip we



Part of the Sloth as it existed in wire wrap form. The Z80 is at the bottom.

could connect it directly to the IORQ line. However, we have two, both of which would be activated whenever any sort of port instruction was encountered by the processor. As such, we have to be a bit more selective, and, again decode the address lines in something like the way we did for the memory quarters.

If the processor wants to address port four it will have to set its A2 address line. If it wants to address port eight it will have to set A3. This is what the gates watch for. If A2 is set the IORQ signal gets passed to the 8253. If A3 is set it'll go to the 8255. Obviously, in writing programs we must be careful not to use illegal port addresses which could set both lines.

In a more elaborate system, with more ports, we'd have to devise a more sophisticated way of decoding the addresses. In fact, there are special chips which will handle this for you.

Still More Interruptus

There are a few other important things happening here. The system clock, the crystal and part of the 74LS04, is probably a fairly understandable thing. It goes to the clock input of the chip. However, it can also be jumpered into one input of the 8253. In addition, there's another clock generator formed around the 555. This bodes complexity, to be sure.

There are two lines on the Z80, the IRQ and the NMI, which do hardware interrupts. We've looked at interrupts quite extensively on the IBM PC in the last issue. If we consider the NMI line as an example, it's easy to see what all this about.

The NMI, or non maskable interrupt, is a call to the processor to drop whatever it's doing and do something else. If we pull the NMI line the chip will finish its current instruction and execute a sort of CALL instruction to the routine it finds in location 0066H of the ROM. No, I can't say why it likes 0066H so much. This routine is called the NMI handler.

In the normal state of affairs, the NMI handler should save all the system's registers somewhere, do whatever it's supposed to do, and return to the place where the Z80 was when it was interrupted by executing a return from interrupt instruction... something like the RET we use to return from a subroutine.

This is a great facility, as it allows us to make the Z80 do something repetitively without writing any complex software, for example. We can put whatever want it to do in the handler and just zap the NMI line as often as we want it to happen. In the case of the Sloth, we hit the NMI a hundred times a second to make it drive the LED displays and update the real time clock... we'll get into all that in a future piece.

There remains, then, the problem of finding something to zap that line with. The simplest way is to create an oscillator, such as the one that's littered about this 555 chip, and connect it to the NMI. This has two drawbacks. To begin with, 555's aren't all that stable. If it's important that the NMI be hit exactly a hundred times a second this probably won't do. Secondly, this provides the computer with no way to disable the pulses into the NMI if it wants to have all of its facilities available to think with.

In writing programs we must be careful not to use illegal port addresses which could set both lines.

The other alternative is to use the 8253... which is actually what I put it in there for. The computer can program it to divide the clock signal down by whatever number we need to to derive a one hundred cycle pulse chain... this being a two megacycle clock, it would be twenty thousand. The 8253, then, allows the computer to decide how often it will be interrupted, if, in fact, it will be interrupted at all. It also means that the interrupt rate will be as accurate as that of the clock.

I've put both interrupt sources on the board because there will be times that we'll want to use all three dividers in the 8253 and won't really care about the accuracy of the interrupt rate. The J2 jumpers determine how the 8253 will be used. In fact, for simple applications it needn't be used at all.

Reboot

At this point, the workings of this simple computer should be pretty clear... at least at the hardware level. We'll be looking at its construction, its display section... which is pretty pedestrian, actually... and its software in later articles. However, you will probably be able to figure out a lot of how the software will work if you're up for thinking about it. What remains is to understand the software required to drive those peripheral chips... this is, admittedly, a bit involved in places.

Most users never get into the insides of computers... and it's probably easy to see why. They look dangerous in there. It's probably worse if you have a manual. Without one you only *think* you know what you're in for. However, the basic workings of computer, as you can see, aren't really all that bizarre. Everything can be broken down into little blocks and understood.

The most confusing aspects of computers, their warrantees and licensing agreements, are cheerfully absent from the Sloth. **CN!**

The Secret Life of Bank Machines

There have to be computers inside those lurking electronic tellers, faithful servants of the late, the lazy and the swing shift. Check out the works.

by Frank Lenk

According to IBM, only thirty percent of the people in an urban center such as Toronto are presently taking advantage of automatic teller machines. Obviously the less technophillic strata of society still view these black, monolithic beasts with considerable awe and trepidation.

This backward attitude is quite understandable when you ponder upon how little is actually known about the contents of those blank boxes. Perhaps you should consider whether you would trust something that looked like a clothes cupboard wearing a half inch of armor plate. Well, maybe you would. You wouldn't want your sister to marry one, though.

In addition to the armor plate and a small array of coloured buttons, you may have noticed that many of these ATM machines also sport the familiar IBM logo. 'Tis true... the largest number of these brutes originate with 'big blue'. I asked them nicely, and they obliged by giving me a bit of a tour of the hidden mysteries of the ATM realm. A lot of this stuff then turned out to be not so mysterious after all.

Once Upon a Time

It may come as a bit of a shock, but self service banking is now at least fifteen years old.

By the late 'sixties there were already some twenty self serve machines dotted around Toronto. Unlike today's generation, these older machines were designed to provide cash on a sort of emergency basis, giving their users cash advances against their credit cards. If you think way back, you'll realize that the credit card itself only became meaningful in the mid 'sixties.

The original cash dispensing machines were "through the wall" efforts, embedded directly in the flank of your local bank branch. They provided bundles of currency with virtually no choice of its amount or denomination.

In 1973 IBM introduced its 3614; the first true automated teller. Other companies came up with similar efforts at about the same time. The 3614 was upgraded in 1975 to the 3624, which is the same machine we know and love today.

This machine was capable of providing a reasonable range of services including cash withdrawal in flexible increments, cash and cheque deposits, transfers between accounts, bill payments, account balance and in some instances a few other things that don't immediately come to mind.

The 3624, useful beast that it is, may have seemed like the ultimate in automated banking convenience. Of course, it isn't. This very year has seen the introduction of a yet more advanced system from IBM entitled... or ennumbered... the 4730.

Actually, IBM likes to call its new pride and joy an 'ABM'... an automated banking machine. Not surprisingly, it offers quite a few extra services over what the 3624 could do. For example, it can handle exact change dispensing in up to five denominations of paper money and four of coin. More significant, however, is that users of it will be able to take advantage of mechanized cheque recognition.

Cheque recognition is being based on something called the MICR, the magnetic ink character recognition code, imprinted along the bottom of every cheque blank. It's that row of almost ridiculously computer style numbers. The 4730 is going to be able to decipher this numbering and cash cheques to their exact face value. Moreover, the machine will accept considerable preprogramming, allowing one's maximum withdrawal limit to be set, or even letting it anticipate certain regular transactions... like a monthly government cheque, for instance.

By the way, those users with more greed than scruples... and more nerve than brains, for that matter... should know that

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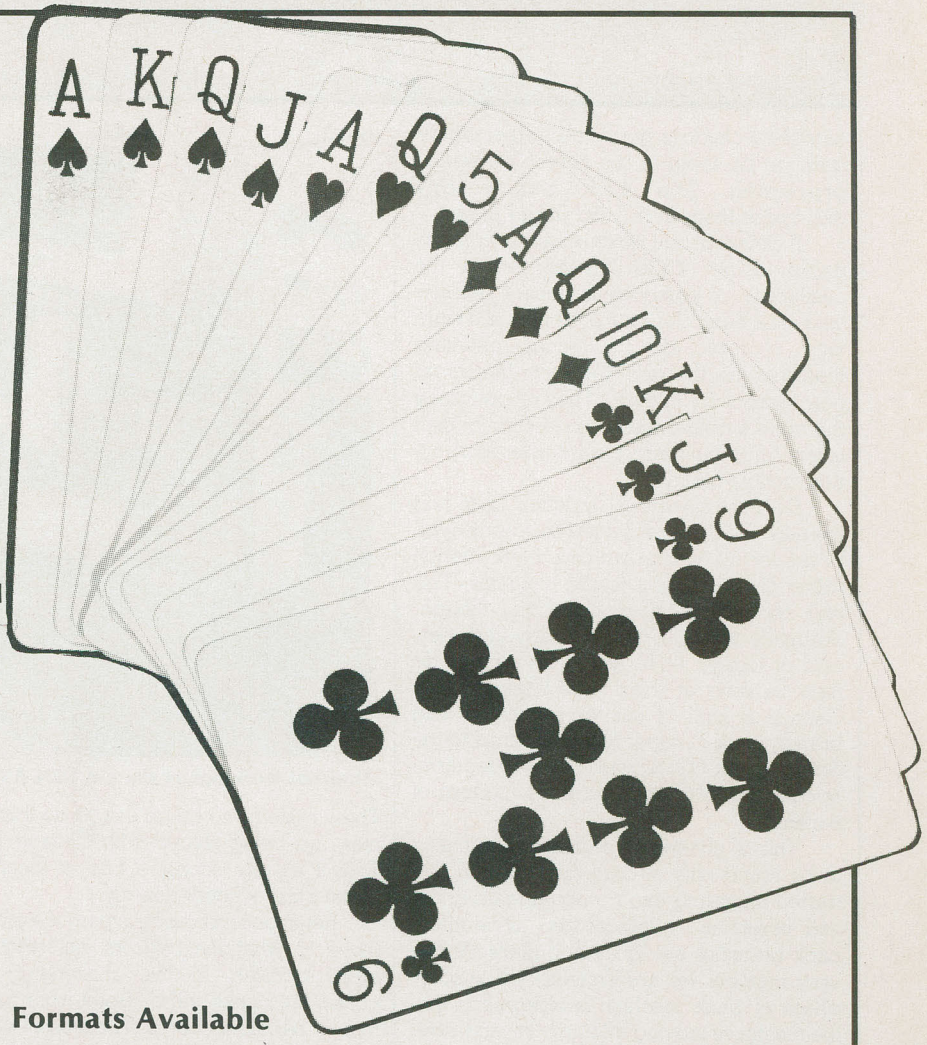

Allan's Bridge, written by John and Lynda Allan is an exciting new Canadian software simulation of the world's most popular card game. You can choose to be North, South, East or West, playing with a computer partner against two computer opponents or set it up for 2, 3 or 4 players.

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Allan's Bridge requires BASIC (it can use, but does not require, Extended BASIC)

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The Secret Life of Bank Machines

cancelled cheques get some further MICR stamped on them in the course of regular processing. The 4730 can readily distinguish them from valid virgin paper.

A development quite separate from the debut of the 4730 has concerned the availability of passbook statement self service. The Bank of Commerce now has eighteen of these do it yourself updating machines on the go. However, there's no new technology in these. They're essentially the same terminals used by genuine human tellers, only built into a somewhat more indestructible cabinet.

Both the passbook updating units and the new 4730 are packaged as console type boxes for installation within a bank branch rather than exposed to the elements. This isn't too much of a limitation, though. Strangely enough, about ninety–five percent of today's ATM users still want to do their banking at their local bank branch. Canada is kind of heavily populated with branch banks... especially compared to the States . . . and Canadians have gotten firmly entrenched in an appropriate pattern of banking.

This is changing gradually. Originally to be found only at bank branches, ATMs started migrating into shopping malls in the mid 'seventies... a logical step, since many bank branches are located in malls. At this very moment we are entering yet another phase of bank machine proliferation, with the machines moving into airports and even retail stores.

The first evidence of this latter phenomenon will be the Money*Mark machines now being installed by The Bay.

Internal workings of the old 3624 ATM.

These systems, to be on the go by this summer, are being shared with Canada Trust. They'll let one access a Bay or Simpsons credit card account directly.

Retail outlet banking is part of a gradual move to what the bankers call *electronic funds transfer*. In this challenging final phase, the banks will be freed from routine money handling chores. The advent of EFT will "take away the process function", says IBM. "Getting cash is almost like a utility... like going to a tap and getting water." Full EFT service will include inter–bank transfers and even international transfers. It will also include presently unrelated chores such as ticket sales, hotel check in check out and an unprecedented degree of retail self service.

Banks, apparently, will be relieved at the change. They will be able to pursue a more interesting role in the world of financial services, devoting more resources to loans, mortgages, investment counselling, insurance and all sorts of other goodies.

Automated banking will be left with only one final frontier to conquer... moving into our livingrooms.

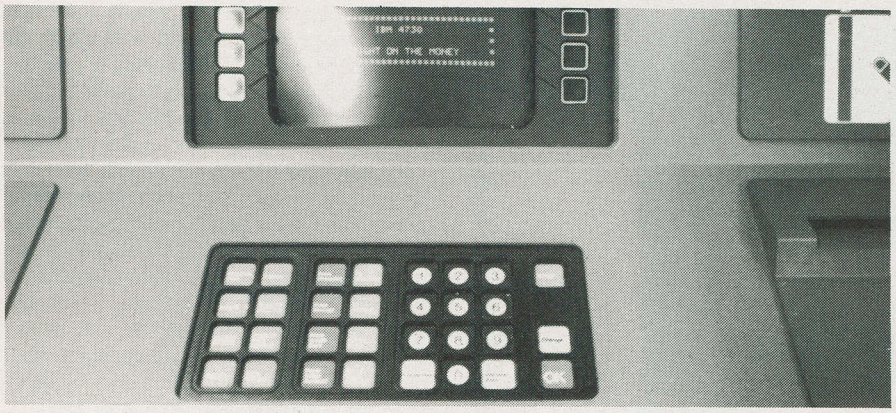
A peek inside the new 4730 'ABM'.

Bank on It

Now that we know what ATMs do, it would certainly be nice to have some idea of how they do it. There's obviously a computer lurking in their somewhere... otherwise this article would be gracing the pages of Sorcery Today.

The garden variety ATM is mostly a smart terminal. This is definitely true of the IBM 3624 and 4730. All of the heavy financial data resides somewhere on a host mainframe... the ATM takes it upon itself to let you access this database.

The smart controller in the ATM responds to an *image* downloaded from the host system. This image is essentially a parameter table defined by the bank, specifying operating limits such as the types of cards to be accepted, the number of retries permissible for entry of the card holder's passcode, the content of the messages to be displayed under various circumstances and so on.



As one might suspect, that magnetic stripe on the back of the bank card also contains some useful information. The strip is recorded according to the ANSI *Isotrack II* banking industry standard. It repeats the card number and expiry date exactly as you see them embossed in the plastic. It usually also contains some discretionary data allocated by the bank itself. It's a little known fact, but many if not all ATMs in Canada are bilingual. The choice of language is another important fact registered on the card.

The passcode gives one access to the appropriate accounts in the database. This number is not random... it is usually encoded directly in or from the card holder number, according to the DES... the data encryption standard. Some bank systems decode the passcode right in the local machine, while others check right through the host. However, the code is never stored in any decipherable way... only in its encoded form.

The base engine of the 4730 turns out to be a plain old IBM PC. That is, the basic architecture is essentially the same. Naturally the ATM contains all manner of extras. However, it does have a floppy disk drive. Accessible at the back of the console, the replaceable floppies provide a convenient means of logging the unit's activity. Typical data retained would include incidents such as total logons, unsuccessful logons and cash misfeeds.

The new 4730 sports a real cathode ray tube display. The 3624 uses the older gas plasma technology that was still hot stuff back when ATMs were first being designed... in the dim dark days of the early 'seventies. Recent 3624s have moved from a two line display to a six line panel. This allows the ATM to present a little menu when the "other" account is selected by means of the appropriate key. This lets the user access almost any number of different accounts.

Hard Cash

Considering that these machines are designed purely to handle money, it is appropriate to end up asking how much money they soak up themselves. Well, one of those armor plated 3624s presently sells for about forty-five to fifty thousand dollars. This seems like big bucks, but it's actually only two thirds the cost of the old 3614. A new 4730 costs fifty-five grand or so... a little more than the 3624, but for the money one gets a double console. Obviously prices are coming down at a furious rate.

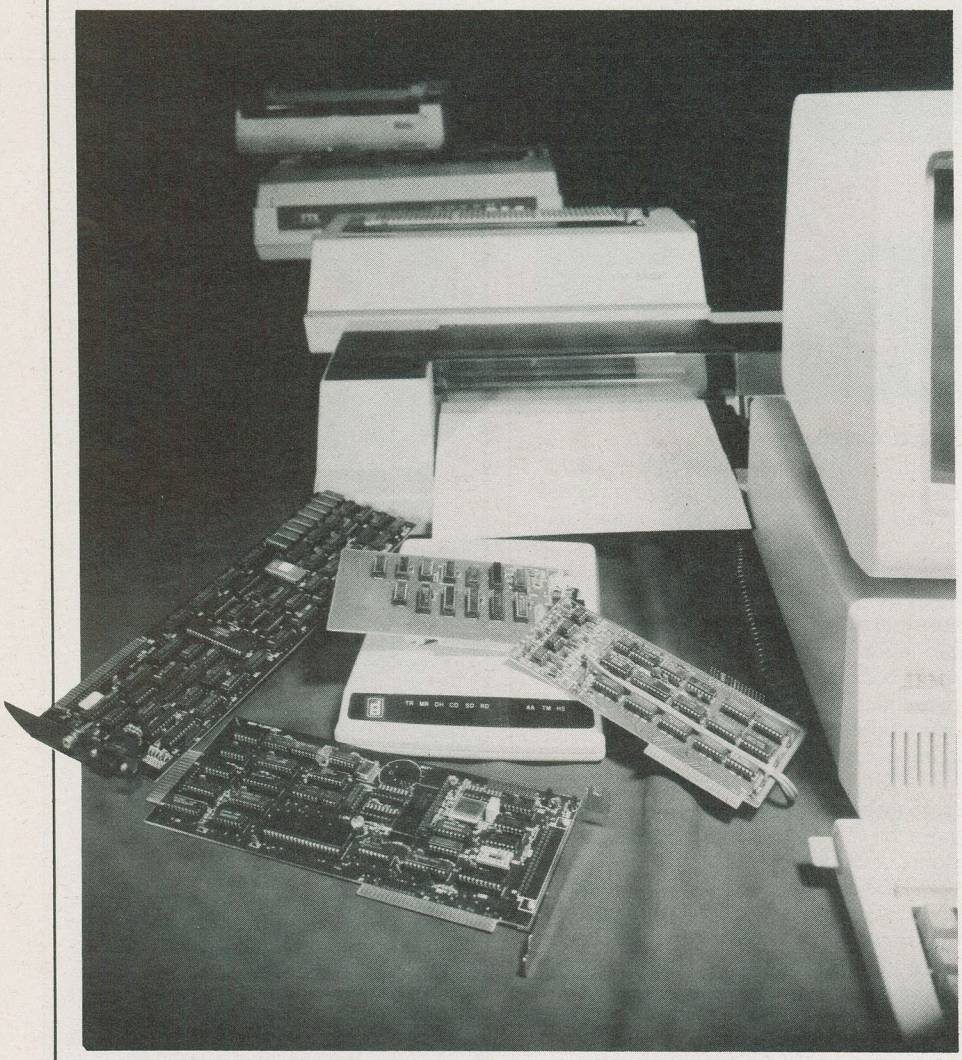
ATMs are not only proliferating like huge metallic rodents; they are also becoming a bit more civilized. The many horror stories of cards being eaten by ATMs should now be a thing of the past. Circumstances under which a card will fail to return to its owner can be specified by the bank. Some managers originally got a bit trigger happy, and machines would occasionally gobble your card at very slight provocation. This is now a rare occurrence.

Instances of accidental misfeeds are similarly rare. A curved card may still catch the slot on its way out. Cards are regularly replaced on a two to three year cycle to minimize the chances of this, but if yours is starting to look like a little toboggan, maybe you'd best look into getting it replaced. Another thing to keep in mind is that its not at all wise to put a card in the same pocket as something magnetic. Magnets erase them. A blank Isotrack stripe gets you nowhere with an ATM.

Still, all this impeccable technology does no good if most of humanity refuses to avail itself of it. There's still a lot of resistance out there that the banks will have to break down before fancy funds transfer becomes a reality.

Maybe if they brought out a colour model that plays PacMan... **CN!**

Peripheral Survey



There are myriad lumps of silicon, plastic and metal that are made to go in, about or reside in the general vicinity of your microcomputer. Here, we have a look at some of the more interesting ones.

Someone ... somewhere ... came up with the idea that a manufacturer could sell something to consumers, then keep selling them various other somethings that they could add onto the original something. In the automobile business, these other somethings are called options, though they're usually added onto car at the time of purchase. In the microcomputer industry, however, they're called peripherals, and are usually available from the original manufacturer or other manufacturers for your consideration after you've plunked your money down for the main unit.

There are attractive advantages to this system. As the main unit is usually a barebones computer, its purchase price is relatively low. Too, you need only purchase those peripherals you'll need, so you won't end up paying extra for stuff you'll never have a use for.

With this system in mind, there are piles of hardware manufacturers out there offering an even greater pile of peripherals, waiting for you to buy their stuff. Some are truly useful, some moderately so, some tend toward the grey area of sheer pointlessness and some commence barking and gobbling the moment you unwrap them. It's beyond the scope of this ... or, indeed, any survey ... to list every peripheral for every microcomputer. It's also out of a survey's realm to tell you what to purchase and what to avoid, for CN! surveys aren't our answer to *Consumer's Reports*, they're simply to let you know what's out there and where you can get what you find of intrigue.

That said, we're going to have a look at some interesting peripherals for the more popular microcomputers. What makes a peripheral interesting is its being unique in its field of endeavor, being exceptionally good in the same field, or being completely unusual (our favourite). If your local dealers don't carry any of the below peripherals you're interested in, have them call the relevant distributors. Unless you're a dealer, though, please don't call them yourself ... most of the listed distributors don't have the facilities to handle calls from end users.

1541 Express

Function: Disk I/O speed-up
Computer(s): Commodore 64
Manufacturer: Richvale Telecommunications
Distributor: Richvale Telecommunications
Suggested Retail: $49.95
Description: A small interface card, the 1541 Express plugs into the Commodore 64's cartridge port, providing a high-speed port between the computer and the 1541 disk drive. The device is selected or deselected with a two-key command. When active, the 1541 Express speeds up all disk actions, not simply LOADs or SAVEs. As an illustration of its capabilities, LOADs and SAVEs are typically performed two to four times faster when the interface is active. The Express can also be used as a parallel drive interface with a minor modification to the 1541 drive.

Koala Pad

Function: Graphics tablet
Computer(s): Apple, IBM, Commodore 64, VIC 20
Manufacturer: Koala Technologies
Distributor: Frantek
Suggested Retail: $227.90 (IBM), $188.68 (Apple), $151.58 (Commodore)
Description: The Koala Pad is one of the best selling graphics tablets produced to date, due perhaps to it's size, price and ease of use. Roughly the size of an adult's handspan, the pad can be easily accompanied on a crowded desk. Accompanying the pad is a stylus and Micro Illustrator software (Apple and Commodore) or PC Design software (IBM). Micro Illustrator is also available in ROM version for the Commodore. The Koala Pad also doubles as an alternate pointing device to the keyboard and joystick. A variety of software from other vendors make provisions for the pad when graphics or input are required.

AnaDig

Function: Analogue to digital board
Computer(s): IBM PC, IBM PC/XT, IBM Portable and compatibles
Manufacturer: Can-Am Designs
Distributor: EMJ Data Systems
Suggested Retail: $550.00
Description: AnaDig is a high precision data conversion card which comes complete with data collector software. There are 16 analogue to digital unipolar conversion channels and one digital to analogue channel which is selectable as unipolar or bipolar. The conversion rate is 33 KHz and the input/output voltage is zero to five volts.

Moorshead Publications

Almost Free Apple DOS Software

While CP/M is a wonderful thing in its own right, the Apple computer can also, and usually does, operate under DOS. For this reason, there's a multitude of programs available for it. Below, we offer a mini-multitude of our own.

The following programs will operate on any Apple][+, //e, //c, or true compatible operating under DOS 3.3. Apple users operating only under ProDOS may have to make alterations to some programs.

Almost Free Apple DOS Software #1

Picture Coder: All Apple HiRes pictures take up 36 sectors in their binary form. This program creates a textfile of a program in memory, squeezing out the zero bytes, that can later be EXECd into memory. The textfile often takes up less room on the disk.

DNA Tutorial: Operating under Integer BASIC, this program might appeal to 'clone' owners. In actuality, though, it's an interactive low-res graphics tutorial of DNA in its inherent forms. And you thought your Apple was only good for games...

Toad: Speaking of games, this program is an Applesoft BASIC implementation of 'Frogger' that can be controlled with either a joystick or the keyboard. The user's high scores are saved to disk.

Function Plotter: A fairly extensive Applesoft BASIC program that takes any inputted function and plots it on the HiRes Screen.

Data Disk Formatter: Apple DOS disks need not be bootable to be useful. This binary program formats a disk without setting DOS on the tracks, conserving useful disk space.

BASIC Trace: A program for the advanced Applesoft programmer, this file, when EXECd, displays the hexadecimal locations of each Applesoft line number of a program in memory.

Gemini Utility: A word processor pre-boot for Gemini printer users, this BASIC program initialises the printer's font or pitch before you boot your word processer.

Payments: This BASIC program allows you to keep track of payments and credits to and from up to 100 accounts on a single disk. A sample account is included.

Databox: A small but useful database program in Applesoft BASIC. Sample files are included to get you started.

Nullspace Invaders: A quick BASIC HiRes game testing coordination and judgement as you manipulate a monolith through mysterious gates.

Almost Free Apple DOS Software #2

Amort: A monthly amortization program that calculates monthly payments to an inputted figure, calculates principle, interest on every balance, and prints out the resulting chart.

Voiceprint: An unusual program that uses the HiRes screen to sample sounds inputted through the cassette jacks at the back of your Apple. Sampling rate and other variables can be controlled, and two sounds may be compared side-by-side.

Calc NOW!: Written in BASIC, this spreadsheet program is somewhat slower than VisiCalc, but still offers the power you expect from a spreadsheet. With sample files.

Cavern Crusader: A mix of BASIC and binary programming, winning this HiRes game is difficult, to say the least. For every wave of aliens shot in the cavern, there's always a meaner bunch in the wings.

Newcout: With source file. This binary program replaces the I/O hooks in the Apple with its own so you can operate your Apple through the HiRes screen. Comes with a character set.

Charset Editor: A utility to help you create your own character sets to use with Newcout.

Calendar: A BASIC utility useful for finding a particular day of any inputted month and year, or for printing out any given year.

LCLODR: With source. This binary utility BLOADs any given file into the 16K language card space at $D000. The source is useful in showing how to use DOS commands through assembly language.

Cristo Rey: An animated HiRes BASIC program showing Cristo Rey by moonlight. For apartment-bound romantics.

ATOT: That's an acronym for 'Applesoft to Text'. EXEC this textfile to produce a textfile of your program.

Applesoft Deflator: This program takes a textfile made by ATOT and squeezes it, replacing PRINT statements with '?' and removing unnecessary spaces from the listing.

Almost Free Apple DOS Software #3

General Ledger: A fairly massive BASIC General Ledger program. This program creates a number of files, so it's best put on a separate disk before implemented.

EE-Design: A shape design aid program written in BASIC. Allows the user to plot shapes in HiRes and either save them to disk or print them out.

Quickzap: A disk sector utility that reads a given track and sector into memory and allows you to alter it, and optionally write it back to disk.

Softgraph: A complete graphing program written in both Applesoft and binary that enables you to see your data done up professionally in pie, line or bar charts.

IntelliCalc: An intelligent calculator with three memories and a 'paper tape' readout. Data may be inserted at any point.

Pokerl: An Applesoft BASIC implementation of the game that has ruined many a marriage. Fortunately, you can afford to lose your electronic paycheque to you Apple... for now.

Polar Graphics: Similar in some ways to Function Plotter, this Applesoft program supplies a number of attractive functions in REM statements that you may utilize to plot out on the HiRes screen.

Clock and Clock II: Two Applesoft digital clocks. When your Apple's doing nothing better, it can now remind you of the time you're wasting. One has an alarm function.

Flowers: With source. A binary program that prints a border of flowers to the HiRes screen. The source is invaluable in showing how to handle HiRes shapes in assembly language.

Convert Utility: A BASIC program that converts numbers between decimal, hexadecimal, binary and disk sectors.

ProDOSfix.TXT: Apple clone users who've purchased ProDOS will note that it doesn't work on their machines. This text tutorial explains why, and how to remedy the problem.

Fine Print: The majority of this software has been obtained from on-line public access sources, and is therefore believed to be in the public domain. Any remaining programs were written in-house. The prices of the disks defer the cost of collecting the programs, debugging them, reproducing and mailing them, plus the cost of the media they're supplied on. The software itself is offered without charge.

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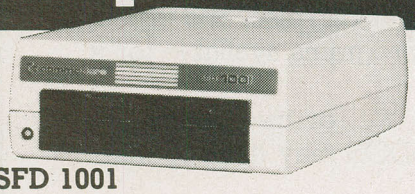


SFD 1001

Function: High capacity disk drive
Computer(s): Any IEEE equipped Commodore
Manufacturer: Commodore/Progressive Peripherals
Distributor: Phase 4 Distributors
Suggested Retail: $599.95
Description: Though the SFD 1001 is equal in physical dimensions to Commodore's 1541 disk drive, its performance (both in capacity and speed) exceeds that of the 1541. Offering double sided, double density, SFD (Super Fast Drive) formatted disks are capable of storing over one megabyte of data. For comparison, one needs only 16 SFD formatted disks to hold the data of 100 1541 formatted disks. The SFD's faster speed is achieved through connection to the Commodore's parallel IEEE bus and a bus expansion IEEE interface. When connected in this fashion, the SFD 1001 LOADs programs over twice as fast as the 1541. When connected serially, the drive can still perform LOADs faster than the 1541, but the margin between the two LOAD times is considerably less. The SFD 1001 is accompanied by software utilities for both the CBM 8032 and the Commodore 64 to facilitate file and program transfers to SFD format disks.

RAMdisk 320K

Function: Standalone RAM disk
Computer(s): Apple
Manufacturer: Axlon Incorporated
Distributor: Axlon Incorporated
Suggested Retail: $495.00 U.S.
Description: The RAMdisk 320K consists of a slot-independent interface card and 320K of RAM within a housing equal to the dimensions of Apple's Disk][. Compatible with DOS 3.3 and Apple Pascal 1.1, the unit is designed to appear to the Apple to be two 35 track disk drives. Owing to the lack of moving parts within the unit, virtually any application program requiring drive access will benefit from the considerable boost in access speed. Three hours of backup are provided by the rechargeable battery built into the unit in the event of a power outage. LEDs on the unit display it's status; which 'drive' is active and if the battery's active. Diagnostics, fast load, fast copy and business applications software is included with the system.

The Eye

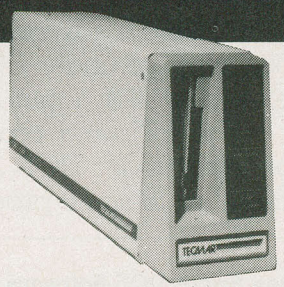
Function: Home or business security
Computer(s): Apple
Manufacturer: Lehigh Valley Computer Group
Distributor: Frantek
Suggested Retail: $328.60
Description: The Eye enables the computer to be used as a complete home or business security system. The system features an on-board, battery backed up real-time clock for time control when activating the system and timing entry delays. Three separate detection circuits are used to accommodate either normally open or closed devices. Each of these circuits can be controlled independently—useful if you like to keep a window open at night. The system also features an on—board BSR remote controller to activate lights by sending signals over the user's AC power line. This, combined with the timer, can give the appearence that your vacant home is occupied, or it can turn your lights (or selected appliances) on as you arrive home from work. The system includes a complete supporting software package, a circuit board, four magnetic entry switches and a piezo-electric alarm.

Quadsprint

Function: Processor board
Computer(s): IBM PC, IBM PC/XT, IBM Portable and compatibles
Manufacturer: Quadram Corporation
Distributor: Chevco Computing
Suggested Retail: $1045.00
Description: Quadsprint is an 8086 processor card that takes up one slot in the host computer, and is installed through a plug-in cable that connects to the 8088 socket on the PC's motherboard. On board the Quadsprint is a 10 MHz 8086 microprocessor with four kilobytes of high-speed cache memory. Existing system memory is not affected by its installation. With the processor board, users can upgrade their PC's processing performance to near the capability of the IBM PC/AT without changing software. At 10 MHz, the 8086 is virtually as fast as the IBM PC/AT's 6 MHz 80286 microprocessor. Quadsprint is totally transparent to existing PC software, including Lotus 1-2-3, WordStar, dBASE II and Microsoft Windows.

Computereyes

Function: Video acquisition system
Computer(s): Apple][series, Commodore 64; Atari version forthcoming
Manufacturer: Digital Vision
Distributor: Phase 4 Distributors Incorporated
Suggested Retail: $199.95
Description: Computereyes is a slow-scan device that connects between the host computer and any standard video source, such as a video tape recorder, video camera, videodisk and the like. Under software control, a black and white image is acquired in less than six seconds. A unique multi-scan mode provides realistic grey-scale images. Images are translated and appear on the computer's high resolution screen, where they may be saved to disk and optionally dumped to a dot matrix printer. Software provided with the system includes machine language capture routines, a menu-driven 'executive' and packing and unpacking routines that save disk space and speed image loading and saving. The Commodore 64 Computereyes connects directly into the 64's user I/O port; the Apple version connects via cable into the Apple's game port.



QIC-60W20

Function: Combination hard drive and tape backup
Computer(s): IBM PC, IBM PC/XT, IBM PC/AT and compatibles
Manufacturer: Tecmar
Distributor: EMJ Data Systems
Suggested Retail: $5395.00
Description: Packaged in a standalone modular unit, the QIC-60W20 provides 60 megabytes of tape backup and a 20 megabyte hard drive. Equipped with a three-head tape deck, the unit provides immediate 'read after write' verification of data, which saves time during backup operations. A built-in power sensor detects power reductions within the computer, protecting the heads from writing on data during a power shortage. An automatic track positioner ensures that a tape's data can be properly read and then shared among several drives. The QIC-60W20 stands seven inches high and is about 15 inches in length.

Voice Master

Function: Voice digitizer
Computer(s): Commodore 64; Apple version forthcoming
Manufacturer: Covox Incorporated
Distributor: Phase 4 Distributors Incorporated
Suggested Retail: $139.95
Description: Voice Master is actually three products in one; it's a speech synthesizer that can speak in the user's voice, a word recognition system that enables the user's computer to respond to spoken commands and a music instrument that can be played by humming or whistling. The synthesizer, through the included combination speaker/microphone headset, 'records' up to 64 words into the computer's memory which can be played back normally and speeded up or slowed down. The digitizing sample rate can be changed, as can volume. All three capabilities of the Voice Master are controlled through its included software, and the user can elect to control the unit in the computer's immediate mode or programmatically. Voice Master consists of the main unit, which plugs into the 64's joystick port, a microphone/earphone headset and controlling/utility software.

Addresses: Axlon Incorporated, 170 North Wolfe Road, Sunnyvale, California USA 94086 (408) 730-0216 ● Chevco Computing, 6581 Kitimat Road, Mississauga, Ontario L5N 2X5 (416) 821-7600 ● EMJ Data Systems Limited, 291 Woodlawn Road West #3, Guelph, Ontario N1H 7L6 (519) 837-2444 ● Frantek Software Distributors Incorporated, 1645 Russell Road, Unit 2, Ottawa, Ontario K1G 0N1 (613) 523-7272 ● Phase 4 Distributors Incorporated, 7157 Fisher Road South East, Calgary, Alberta T2H 0W4 (403) 252-0911 ● Richvale Telecommunications, 200 West Beaver Creek Road, Unit 14, Richmond Hill, Ontario (416) 889-9090

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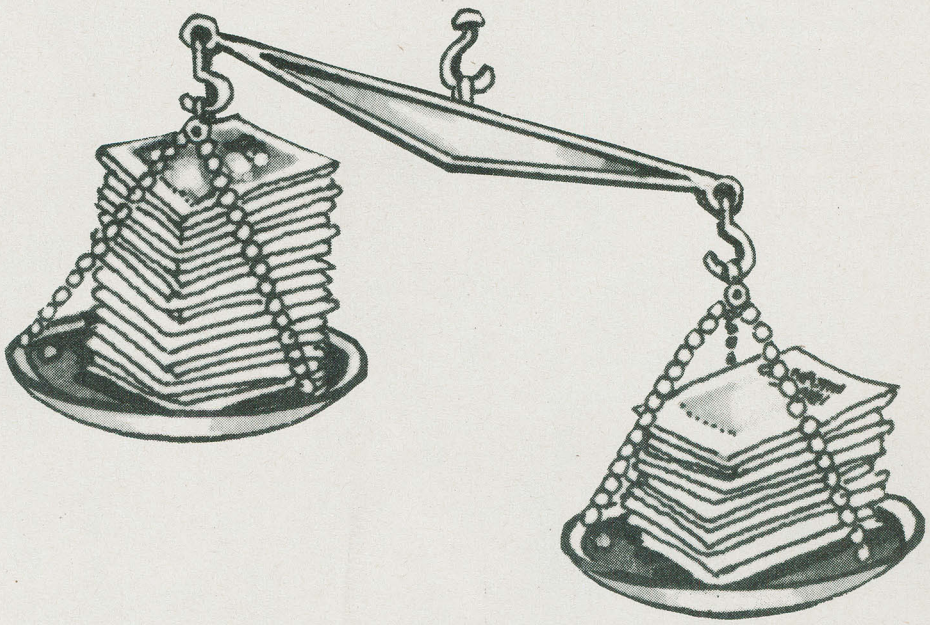

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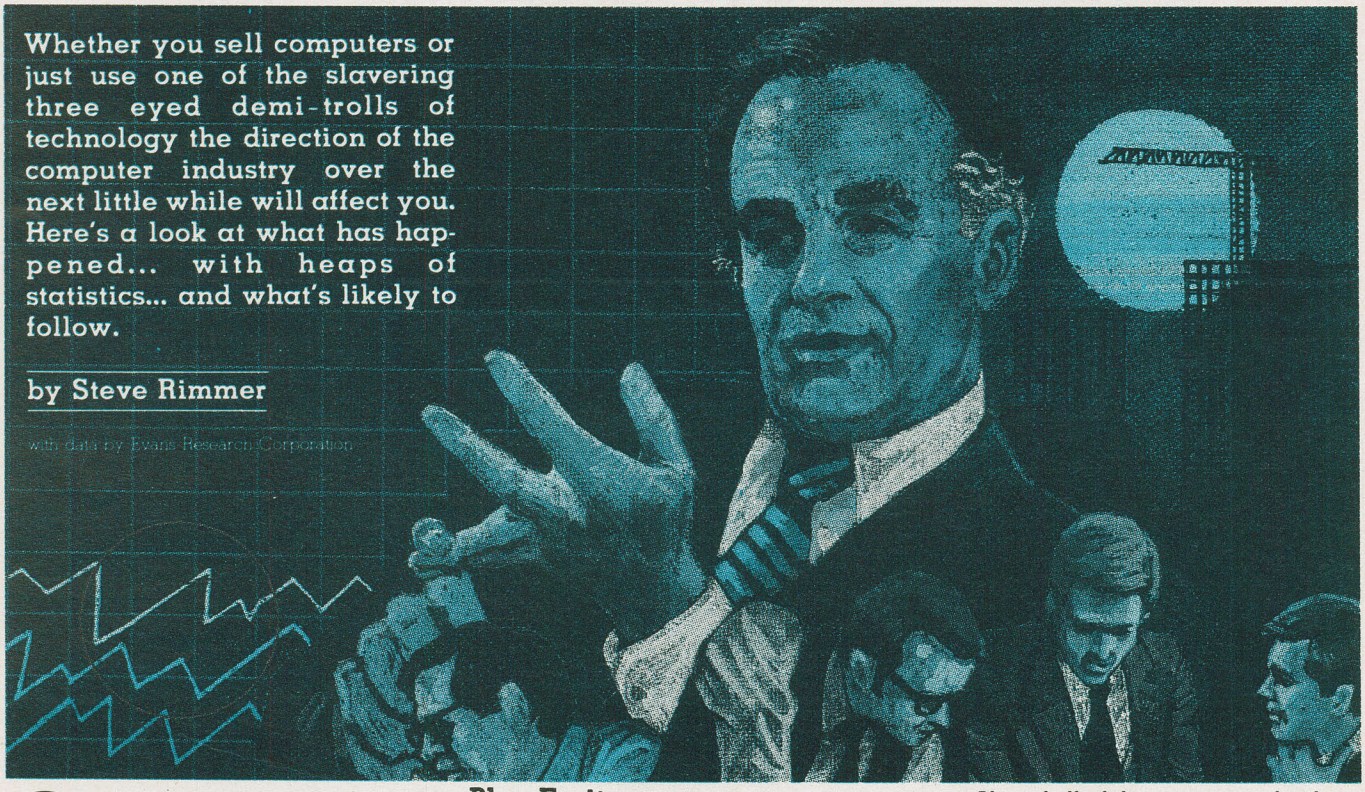
Microcomputer Industry Trends

Whether you sell computers or just use one of the slavering three eyed demi-trolls of technology the direction of the computer industry over the next little while will affect you. Here's a look at what has happened... with heaps of statistics... and what's likely to follow.

by Steve Rimmer

with data by Evans Research Corporation



One of the things which computer dealers and other souls engaged in the heavily commercial aspects of high technology like to think about is who buys their stuff... and who will buy it in the future. In fact, "think" is probably rather an understatement. They sweat profusely over it, washing complete families of innocent mice away in the deluge.

For the rest of us, the countless charts and graphs and skewed curves that the boys in the statistics bureaus generate are only passingly interesting. However, the state of the microcomputer industry does affect us all indirectly as its relative health determines the availability of future toys. The suits just won't invest money in new hardware and software if they think everyone is getting back into CBs.

Evans Research is one of those statistics companies which plays with charts and graphs and skewed curves quite a lot of the time... and occasionally crawl to the summits of their mountains of printouts to issue reports about what they have found. Most of the time, one suspects, they find coffee cups with unmentionable green things in 'em raising families.

The information in one of their most recent papers deals with the state of the computer industry... in terms of who has what and what they're doing with it. Here's a quick look at some of the numbers.

Blue Fruit

The Evans Research report . . . turn to volume fourteen number two in your hymn books, friends... was compiled by contacting 1,873 Canadian companies with less than forty million dollars in annual revenues... you know, lemonade stands. There are actually about a million such businesses in Canada, employing over six million people, or so the report says. About twenty-four percent of these companies said that they'd be getting microcomputers by the end of this year.

Eighty-four percent of the companies which intend to get computers have at least one at the moment. Twenty percent of the companies which have microcomputers got them before 1982. Thirty-six percent got them before 1983.

The number of companies which have microcomputers is expected to grow forty-four percent this year.

Of the companies which don't plan to get computers, forty-four percent indicated that they felt themselves to be too small to benefit from acquiring any toys. Twenty-five percent use a larger computer service. Thirteen percent said that computers are too expensive.

Over half of the companies have only a single printer. Of the companies that plan to buy a printer, sixty-seven percent will only buy one.

About half of the companies that have computers use hard disks. Most of the companies which have them only have one. As it was with the printers, those that plan to get hard drives will probably only get one.

About forty-two percent of the companies which have computers also have modems. Most companies only have one.

The use of software packages grew sixty-nine percent from 1984 to 1985. This represents, for example, seventy-two percent of the companies with computers using accounting and financial software last year as opposed to ninety-two percent this year. Spreadsheets are the next most commonly used application, followed by word processing.

The use of electronic mail grew by a hundred and twenty-five percent last year.

Statistic Symbols

Over seventy percent of the companies which have computers said they were very satisfied with the features of their systems. This breaks down into eighty-four percent of IBM PC owners being satisfied, followed by sixty-five percent of Apple users. Osborne users had the highest level of dissatisfaction.

Users of Radio Shack and Commodore computers are the most dissatisfied with their software. Half of the users of Osborne and DEC said that they weren't satisfied with

Table 1

The approximate numbers of computers sold by IBM and Apple in Canada by model.

IBM PC	32,500	Apple II	28,400
IBM Portable	2,000	Apple III	400
IBM PC XT	9,800	Apple Lisa	800
IBM PC AT	900	Apple Macintosh	10,400
IBM PCjr	8,500		
IBM 3270/370	300	Total	40,000
Total	54,000		

the training and education they'd received for their computers.

Fifty-nine percent of the companies who'd bought computers got them through retail stores. Of the companies which were located in Quebec, thirty-seven percent bought their computers through value added dealers. Some of the value which was added, in these cases, was French language programs and documentation.

Quebec companies had the lowest use of microcomputers in Canada.

There are about eight hundred active computer stores in Canada. About sixty-five percent are located in Quebec and Ontario. About seventy-eight percent of all the IBM micros are sold through its authorized dealers. Ninety percent of all Apple computers are through its dealers.

The three best selling microcomputers are the IBMs, Apples and the Compaq.

IBM and Compaq have thirty percent of their dealers in metropolitan Toronto. Apple has fewer than twenty-one percent in the same area.

More than half of the small and medium sized business market has been captured by IBM and Apple with the lion's share going to IBM. It accounted for forty-two percent of the microcomputers in place by the end of 1984. Apple's share has declined from seventeen percent in 1983 to thirteen percent in 1984. It's predicted that it will drop to eleven percent in 1985.

In its first nine months, the Apple Macintosh was outsold by the IBM PC by eight units to five.

Bringing it Home

The home market is getting a bit weird... but, then, it likes to do this. The sales in the last two months of 1984... the usual time to shoot the works... were down twelve percent from their levels of the previous year. This is only expected to increase by about one percent this year.

Apple sold about ninety percent of its Apple IIc computers to the home market last year.

The new computers expected from Commodore and Atari will probably result in a general drop in the price of home systems of fifteen to twenty percent in 1985. New systems are expected to cost less than a thousand dollars. The Apple IIc, by comparison, lists for about fifteen hundred dollars, and could not be sold profitably at under a thousand.

About seven percent of the households in Canada have microcomputers... there are about eight and a half million households in Canada. However, among families having an average annual income of over twenty-five thousand dollars about thirteen percent have computers. By 1990 an estimated fifty-seven percent of households will have microcomputers. **CN!**

For more information contact Evans Research, 1 Eva Road, Suite 309, Etobicoke, Ontario M9C 4Z5.

Walking Fingers For the PC

The D.COM program is such a lowly little troll . . . users of earlier systems have come to take its existence for granted. Now the lush green directories of your PC can ring with the echo of your return key.

by Steve Rimmer

Floppy disks are one of the sweet mysteries of high technology. If you have several systems around which use five and a quarter inch disks you'll be really painfully aware of this if your filing system gets a little sloppy. You can't just hold them up to the light to see what they do.

The IBM PC handles its floppies in a variety of confusing ways... just when you think you have it all together they hit you with subdirectories and paths, redirection and the five eyed slithering techno–iguana of file handles... oh, you haven't come across the iguana yet... hmmm, you're in for a shock.

One of the fundamental things one encounters on floppies of all types is the existence of a directory track. In its simplest form, this can be regarded as the mylar equivalent of the contents page of a book. It tells the computer what's on the disk... the file names... and where the data corresponding to these titles resides.

In fact, the PC's directory lists a lot more information than this, such as the last time the file was modified, whether or not it can be modified again, the amount of space it occupies and so forth. Along these same lines, the system seems to feel moved to present one with a lot of this information whenever one asks for a simple directory listing.

The PC will show you the directory listing in either of two remarkably inconvenient formats. The wide listing will generally display all the stuff on a normal floppy in one screen full... but it doesn't say a thing about the files, and, furthermore, omits such nuances as sorting them into some useful order. The long listing mentions the lengths of the files... and a bunch of other sundry... and usually ignored... data, but if you have more than twenty or so files on the disk the top of the pile will roll off the screen.

This is obviously something which the designers of MS–DOS

worked into the operating system so as to allow people the opportunity to write a utility program.

In this feature we'll look at the code for a simple sorted directory program for the IBM. Looking a lot like the D.COM programs which CP/M users have come to know, this little albatross will avail one of a sorted directory listing of any size directory with the size of each file on the screen. It's thunderously slick and extremely useful. Assembling to less than six hundred bytes, it's also diminishingly small and very nearly as quick as the MS-DOS DIR command.

Trusty Fingers

The D.COM command can take several forms. If you simply type D and return it will show you the directory of the current drive. You can also, however, do

D B:

to see what's happening on drive B or

D B: *.ZOT

to scan for certain sorts of files. In short, it will accept all of the command line arguments that DIR does, with the exception of a width parameter... which would be a bit senseless.

In return for all this attention, D.COM will print up a list of files a bit like the wide directory listing. The files will be in alphabetic order with their file sizes after them. It will also count up the number of files on the disk.

In order to make D.COM work we have to be able to do a number of things. To begin with, the program must parse the command line to extract from it a *file control block*. This is a sort of compacted way of expressing what file... or group of files... one is after in a disk operation. We'll get to this presently. Next we want to suck in all of the appropriate file names and stash them somewhere, to wit, in a buffer. A buffer, in this case, is all the memory after the end of the program itself.

Having called in all the names the next ordeal is to sort them into alphabetic order. This can be done in a number of ways... sorting techniques are the in thing to go on about if you're into higher math. However, because we're dealing with a very simple sort here... with relatively little data... a low budget bubble sort will suffice. We'll check out its working as well.

Finally, we'd like the program to actually output something, as opposed to simply be profound and theoretical. Displaying the sorted data is actually pretty easy because all the file names are returned padded out to the same length... eleven characters... and the other elements of the display are constant too. By means of suitable fudging the program is able to display the directory entries five to a line without even having to put carriage returns at the ends of the lines. Everything wraps around just perfectly.

The only thing that calls for a bit of mind dancing is the way in which the information about the files is going to be presented. The primary use of D.COM is to produce a sort of snappy overview of what's on the disk. You probably don't really care about the date each file was last written to, for example. We'll omit that. You also probably don't care about the exact file size of large files.

The CP/M D.COM programs never really had to worry about file sizes down to the nearest byte because everything was granulated by the operating system to sector lengths. The PC, on the other hand, maintains a count down to the units.

There are a very few cases in which one will want to know what's happening in the low order bits of a large file size value. One needn't know that the thing is 41365 bytes long... forty-one K would be sufficient.

As such, D.COM produces a listing of the files rounded off to the nearest K. It's a bit sleazy this way... it can only deal with files up to about six megabytes in length... but one doesn't encounter that many that are all that much larger.

It does differentiate between big files and little ones. File lengths which are smaller than one kilobyte are expressed as bytes.

```
                COMMENT /

        A short and extremely cool directory program for the
        IBM PC. Copyright (c) 1985 Steve Rimmer.

        "...let your fingers do the walking and all
        you'll ever have to worry about is athlete's
        hand..."
                                - Alexander Graham Surcharge
                        /

VERS    EQU     1                       ;CAPITALIST VERSION
SUBVERS EQU     6                       ;COMMUNIST SUBVERSION

CR      EQU     13
LF      EQU     10

DMA     EQU     0080H
CMDLN   EQU     0082H

FCB     EQU     005CH

        CODEX   SEGMENT                 ;USUAL JUNK AT THE BEGINNING OF
        ASSUME  CS:CODEX                ;PROGRAMS. IF THE MACRO ASSEMBLER
MAIN    PROC    FAR                     ;WASN'T SO SLOW IT COULD BE
        ORG     0100H                   ;POTTED IN A FILE

START:  JMP     START0                  ;HOP OVER BUFFERS
COUNT:  DW      0000H                   ;NUMBER OF FILES
FLAG:   DW      0000H                   ;FLAG FOR BUBBLE RESORT

START0: MOV     AX,CS
        MOV     DS,AX
        MOV     ES,AX                   ;FAKE OUT OTHER SEGEMENTS

        CALL    ILPRT
        DB      CR,LF
        DB      17 DUP ('_')
        DB      ' Mouse Factory Directory Utility Version '
        DB      VERS+'0','.',SUBVERS+'0',' '
        DB      17 DUP (' ')
        DB      CR,LF,LF,0

        MOV     DX,DMA
        MOV     AH,1AH
        INT     21H                     ;SET DMA ADDRESS

        MOV     BX,005DH
        MOV     AL,[BX]
        CMP     AL,' '
        JNZ     NOFILL                  ;SEE IF THERE'S AN ARGUMENT

        CLD                             ;IF THERE'S NO ARGUMENT,
        MOV     DI,005DH                ;FILL IN THE FCB'S NAME FIELD
        MOV     CX,11                   ;WITH ELEVEN QUESTION MARKS


        MOV     AL,'?'
REP     STOSB

NOFILL: MOV     DX,OFFSET FCB
        MOV     AH,11H
        INT     21H                     ;LOOK FOR FIRST FILE MATCH

        CMP     AL,0                    ;IF AL = ZERO NO FILES MATCHED
        JNZ     NOMATCH                 ;SO SAY SO AND SPLIT

        CALL    SEEFILE                 ;ELSE, STASH THE FILE IN RAM

GETNEXT:                                ;GET NEXT MATCH
        MOV     DX,OFFSET FCB
        MOV     AH,12H
        INT     21H                     ;SEARCH FOR NEXT

        CMP     AL,0                    ;IF AL = ZERO ALL DONE
        JNZ     ALLDONE                 ;SO SPLIT TO DISPLAY SECTION

        CALL    SEEFILE                 ;ELSE SAVE IT IN RAM
        JMP     GETNEXT                 ;AND GO AGAIN
```

Walking Fingers For the PC

```
ALLDONE:
        CALL    BUBBLE                  ;BUBBLE SORT THE FILE NAMES
        CALL    LOOKIT                  ;SEE THE FILE NAMES
        CALL    HEADER                  ;PRINT INFORMATION ABOUT THE DISK

EXIT:   INT     20H                     ;BACK TO DOS

NOMATCH:                                ;COME HERE IF THERE'S NO FILES
        CALL    ILPRT
        DB      CR,LF,'[ Gadzooks... no files in ',0
        CALL    SEEFCB                  ;SHOW THE ARGUMENT
        CALL    ILPRT
        DB      ' ]',CR,LF,0
        JMP     EXIT

MAIN    ENDP

HEADER  PROC    NEAR                    ;;PRINT DEMOGRAPHICS OF DISK
        CALL    ILPRT
        DB      CR,LF,LF,0
        MOV     AX,[COUNT]
        CALL    DECIMAL                 ;PRINT HOW MANY FILES THERE ARE
        CALL    ILPRT
        DB      ' files in ',0
        CALL    SEEFCB                  ;SHOW THE ARGUMENT
        CALL    ILPRT
        DB      '  Copyright (c) 1985ad Steve Rimmer ',CR,LF,0
        RET
HEADER  ENDP

SEEFCB  PROC    NEAR                    ;;PRINTS THE COMMAND LINE ARGUMENT
        MOV     BX,OFFSET FCB+1

        MOV     CX,11
SEEF1:  MOV     AL,[BX]
        PUSH    CX
        PUSH    BX
        CALL    PUTCH
        POP     BX
        POP     CX
        INC     BX
        LOOP    SEEF1
        RET
SEEFCB  ENDP

LOOKIT  PROC    NEAR                    ;;SEE EACH FILE NAME
        MOV     BX,OFFSET DIRECT+2      ;POINT TO FIRST FILE NAME
        MOV     CX,[COUNT]              ;GET NUMBER OF NAMES IN LOOP
LOOK1:  PUSH    CX                      ;AND SAVE COUNT
        PUSH    BX                      ;SAVE POINTER
        MOV     CX,11                   ;GET LENTH OF A FILE NAME
LOOK2:  INC     BX                      ;BUMP POINTER
        MOV     AL,[BX]                 ;GET A BYTE
        PUSH    BX                      ;SAVE POINTER
        PUSH    CX                      ;AND COUNT
        CALL    PUTCH                   ;AND SEE THE CHARACTER
        POP     CX                      ;GET COUNT
        POP     BX                      ;AND POINTER BACK
        LOOP    LOOK2                   ;LOOP 'TIL NAME IS SHOWN

        POP     BX                      ;GET POINTER OFF STACK
        PUSH    BX
        ADD     BX,30                   ;POINT TO FILE SIZE FIELD
        MOV     AX,[BX]                 ;GET SIZE
        MOV     BX,0                    ;MAKE BX ZERO

        SHR     AX,1
        SHR     AX,1                    ;DEVIDE BY 4 TO GET K'S
        SHL     BX,1                    ;GET CARRY INTO BX
        CMP     AX,0                    ;IF LESS THAN ONE K, SHOW BYTES
        JZ      BYTES
        ADD     AX,BX                   ;ADD ROUND UP
        INC     AX                      ;FAKE OUT FOR ROUNDUP
        CALL    DECIMAL                 ;AND SHOW IT

        CALL    ILPRT                   ;PRINT SEPARATOR
        DB      'k  ',0
        JMP     NOLOOK                  ;AND THE NAME IS SHOWN

BYTES:  POP     BX                      ;TO SHOW BYTES, GET POINTER
        PUSH    BX
        ADD     BX,29                   ;GET LOWER WORD OF FIELD
        MOV     AX,[BX]
        CALL    DECIMAL                 ;SHOW IT
        CALL    ILPRT
        DB      'b  ',0

NOLOOK: POP     BX                      ;GET MAIN POINTER
        POP     CX                      ;RESTORE COUNT

        ADD     BX,32                   ;BUMP POINTER BY ONE ENTRY
        LOOP    LOOK1                   ;AND GO FOR NEXT ENTRY
        RET
LOOKIT  ENDP
```

```
PUTCH   PROC    NEAR                    ;SEND CHARACTER IN AL TO SCREEN
        PUSH    AX
        MOV     AH,15
        INT     10H
        POP     AX
        MOV     AH,14
        INT     10H
        RET
PUTCH   ENDP

BUBBLE  PROC    NEAR                    ;BUBBLE SORT FILE NAMES
BUBL0:  MOV     BX,OFFSET DIRECT+2      ;POINT TO FIRST NAME
        MOV     CX,[COUNT]              ;GET COUNT
        DEC     CX                      ;DECMENT BY ONE TO AVOID GARBAGE
        MOV     [FLAG],0                ;SET RESORT FLAG OFF
BUBL1:  CALL    CHECK                   ;CHECK A PAIR OF NAMES
        ADD     BX,32                   ;POINT TO NEXT PAIR
        LOOP    BUBL1                   ;AND LOOP AROUND
        CMP     [FLAG],0                ;IF ORDER HAS CHANGED, SORT AGAIN
        JNZ     BUBL0
        RET
BUBBLE  ENDP

CHECK   PROC    NEAR                    ;;COMAPRE TWO FILE NAMES IN BX
        PUSH    CX
        PUSH    BX                      ;SAVE COUNT AND POINTER
        MOV     CX,10
CHECK1: INC     BX                      ;BUMP POINTER UP
        MOV     AL,[BX]                 ;GET A CHARACTER FROM LOWER NAME
        ADD     BX,32                   ;FUDGE POINTER
        MOV     AH,[BX]                 ;GET A CHARACTER FROM UPPER NAME
        SUB     BX,32                   ;UNFUDGE POINTER (MUNCHIES)
        CMP     AL,AH                   ;SEE IF THEY ARE
        JE      SAMECH                  ;... THE SAME, IF SO TRY NEXT TWO
        JL      NOSWAP                  ;... IN CORRECT ORDER, SO DO NOTHING
                                        ;... IN REVERSE ORDER, SO SWAP
        POP     BX                      ;GET TRUE POINTER FROM STACK
        PUSH    BX
        CALL    STSWAP                  ;EXCHANGE ENTRIES
        MOV     [FLAG],0FFH             ;SET FLAG TO DO RESORT
        JMP     NOSWAP                  ;AND WE GONE... BYE BYE

SAMECH: LOOP    CHECK1                  ;LOOP TO COMPARE CHARACTERS
NOSWAP: POP     BX                      ;RESTORE COUNT AND POINTER
        POP     CX
        RET
CHECK   ENDP

STSWAP  PROC    NEAR                    ;ECHANGE TWO ENTRIES
        PUSH    BX
        MOV     SI,BX
        MOV     DI,DMA
        MOV     CX,32
REP     MOVSB                           ;GET LOWER STRING INTO DMA
        POP     BX
        PUSH    BX
        MOV     DI,BX
        ADD     BX,32
        MOV     SI,BX
        MOV     CX,32
REP     MOVSB                           ;GET UPPER STRING INTO LOWER STRING
        POP     BX
        ADD     BX,32
        MOV     SI,DMA
        MOV     DI,BX
        MOV     CX,32
REP     MOVSB                           ;GET DMA STRING INTO UPPER STRING
        RET
STSWAP  ENDP

SEEFILE PROC    NEAR                    ;;MOVE ENTRY FROM DMA TO RAM
        CLD                             ;SET DIRECTION FLAG
        MOV     SI,DMA                  ;POINT TO DMA
        MOV     DI,[DIRECT]             ;POINT TO NEXT AVAILABLE SLOT IN RAM
        MOV     CX,32                   ;ENTRIES ARE 32 BYTES LONG
REP     MOVSB                           ;DO THE MOVE
        ADD     [DIRECT],32             ;BUMP THE POINTER TO NEXT SLOT
        INC     [COUNT]                 ;BUMP THE COUNT
        RET
SEEFILE ENDP

ILPRT   PROC    NEAR                    ;;IN LINE PRINT
        POP     BX
ILPLP:  MOV     DL,[BX]
        CMP     DL,0
        JE      ILPRET
        MOV     AH,2
        PUSH    BX
        INT     21H
        POP     BX
        INC     BX
        JMP     ILPLP
ILPRET: INC     BX
        PUSH    BX
```

Almost Free PC Software

The best of the public domain for IBM's and Compatibles

Almost Free PC Software

PC-WRITE While not quite Wordstar for nothing, this package comes extremely close to equalling the power of commercial word processors costing five or six bills. It has full screen editing, cursor movement with the cursor mover keypad, help screens and all the features of the expensive trolls.

SOLFE This is a small BASIC program that plays baroque music. While it has little practical use, it's just a kick to toodle with. It's also a fabulous tutorial on how to use BASICA's sound statements.

PC-TALK Telecommunications packages for the IBM PC are typically intricate, powerful and huge. This one is no exception. It has menus for everything and allows full control of all its parameters, even the really silly ones. It does file transfers in both ASCII dump and MODEM7/XMODEM protocols and comes with... get this... 119424 bytes of documentation.

SD This sorted directory program produces displays which are a lot more readable than those spewed out by typing DIR. It's essential to the continued maintenance of civilization as we know it.

FORTH This is a small FORTH in Microsoft BASIC. It's good if you want to get used to the ideas and concepts of FORTH... you can build on the primitives integral with the language.

LIFE This is an implementation of the classic ecology game written in 8088 assembler. While you may grow tired of watching the cells chewing on each other, in time the source will provide you with a powerful example of how to write code.

MAGDALEN This is another BASIC music program. We couldn't decide which of the two we've included here was the best trip, so we wound up putting them both on the disk. Ah... the joys of double sided drives.

CASHACC This is a fairly sophisticated cash acquisition and limited accounting package written in BASIC. It isn't exactly BPI, but it's a lot less expensive and suitable for use in most small business applications.

DATAFILE This is a simple data base manager written in... yes, trusty Microsoft BASIC.

UNWS Wordstar has this unusual propensity for setting the high order bits on some of the characters in the files it creates. Looks pretty weird when you try to do something other than Wordstar the file, doesn't it... Here's a utility to strip the bits and "unWordstar" the text. The assembler source for this one is provided.

HOST2 This is a package including the BASIC source and a DOC file to allow users with SmartModems to access their PC's remotely. It's a hacker's delight.

Almost Free Software for the IBM PC Volume 3

FIXWS. WordStar, the etherial Martian of word processors, has a propensity of leaving odd bits set in its files. This makes them look remarkably like high tech confetti if you type them or otherwise try to stick 'em in other applications. This program effectively turns them back into ASCII.

WRT. DOS 2.0 allows for each file to have a read only flag . . . although it lacks a way of manipulating them. This pair of utilities allows you to set and unset this flag, protecting important files from accidental erasure.

BROWSE. If you type a text file chances are that the part you want to see will scroll past you before you have a chance to see it, and you'll have to type it several times as a result. BROWSE allows you to scroll in both directions, much as you might if you were using a word processor.

CAT. If the DIR display is too dull for your tastes you obviously need CAT, which will tell you everything you could possibly want to know about the files on your disks.

CGCLOCK This is a simple little program which displays the running time in the upper right hand corner of your screen. However, it has lots of display options and works with the colour graphics card.

CURSOR. This program makes the cursor big. It's pointless, but it's only twenty four bytes long.

CMP. This program does a very elaborate comparison of two files and reports their differences. It can for example, spot corrupted files, and has a multitude of uses when dealing with files created by redirection.

JUMPJOE. A bit like Miner 2049'er, this game is certain to damage your mind. You get to be the janitor of a space station. Deal with berserk robots and other weirdnesses. It's a hoot.

CASTLE. This is unquestionably the best public domain we've ever come across . . . when we got it productive work stopped here for about two days. Wander around a deserted castle collecting treasures . . . but mind you don't get killed by the nasties. A solution is included should frustration set in.

78INT. This is a small BASIC program to calculate interest using the rule of seventy eight.

MOON. One of the nicest lunar lander games we've come across, this little beast uses high resolution colour graphics and decent sound effects to hurl you to your doom in style.

PERCHT. This is another serious BASIC program, this time to print Pert charts.

DATNOIDS. As games go, this one is highly strange. In fact, mere words don't serve to describe it . . . you'll have to try it for yourself.

NUKE-NY. This is one of the nastiest bits of software we've ever seen. It produces a full colour high resolution simulation of a nuclear attack on New York city. It's just the thing to give to paranoid people you don't like very much.

NUDE. Yes, it's a bit exploitive and probably in questionable taste, but it's just so well done. This program uses high resoltuion graphics to draw this chick with great . . . huge . . . pixels.

Almost Free PC Software Volume II

Sweep is a turbocharged Ferrarri of a disk utility which makes the COPY command look like a goat herd by comparison. It allows one to do mass copying, deletion, renaming and other disk functions all in menu driven comfort. It supports essentially the same command structure and behavior as the CP/M Sweep and Disk programs.

Worldmap is a sophisticated graphics program which draws a very detailed picture of the planet we live on and daily endeavour to blow up. It will display its wares on the tube or send them out to a printer.

Anitra plays Anitra's Dance by Edvard Grieg. PC music programs are a gas . . . everyone should have a disk full of them.

Ramdisk is among the most useful of all the utilities you'll ever plug into your PC. It creates a virtual drive on your system out of memory. You can pop your files over to it when you boot the beast and thereafter experience disk accesses that take less time to complete than real drives take to turn on their LEDs.

Alien plays a bizarre adventure game. It leads you into some pretty warped places. It comes with a massive data file for an adventure that you won't get tired of 'til the dragons come home for the evening.

FOS is a personal financial manager which will, among other things, make your cheque books into servants of humanity as opposed to denizens of the aforementioned adventure game. It's thunderously slick.

Jukebox represents yet another PC music system. This one comes with a host of songs to play and some really electric graphics.

Asmgen is one of the best text disassemblers we've come across. It takes any executable COM or EXE file and produces an assembler listing. It's surprisingly good at distinguishing between code and imbedded data or text. If you have need to patch or modify code this thing will outdo DEBUG by light years.

Struct will appeal to the rabid programmer in everyone. It allows MASM to be used to assemble a sort of higher level language. Included also is a test file to illustrate the syntax.

Prtsc replaces the internal PC screen dump code with something more suited to reality. It allows one to hit the PrtSc* key and then select what the screen dump will look like from a menu. It supports a number of popular printers.

Breakout plays a PC version of the popular game. It will accept input from either a joystick or the keyboard. The graphics are good and the action is adjustable from a beginner's level right up to fast and nasty.

Util is a collection of system utilities all under one menu driven roof. Among its many talents are a sorted directory, keyboard redefinition and the facility for scrolling up and down through a text file.

$19.95 Each

Almost Free PC Software
Moorshead Publications
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Toronto, Ontario M4H 1B1

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Walking Fingers For the PC

```
        RET
ILPRT   ENDP

DECIMAL PROC    NEAR                            ;;PRINT AX IN DECIMAL
        MOV     BX,OFFSET DECBUF
        PUSH    DX
        PUSH    SI
        PUSH    AX
        MOV     CX,6
FILL:   MOV     BYTE PTR [BX],' '
        INC     BX
        LOOP    FILL
        MOV     SI,10
        OR      AX,AX
        JNS     CLR
        NEG     AX
CLR:    SUB     DX,DX
        DIV     SI
        ADD     DX,'0'
        DEC     BX
        MOV     [BX],DL
        INC     CX
        OR      AX,AX
        JNZ     CLR
        POP     AX
        OR      AX,AX.
        JNS     NOMORE
        DEC     BX
        MOV     BYTE PTR [BX],'-'
        INC     CX
NOMORE: POP     SI
        MOV     DX,OFFSET DECBUF
        MOV     AH,09H
        INT     21H
        POP     DX
        RET
DECBUF: DB      '       $'
DECIMAL ENDP

DIRECT: DW      DIRECT+2                ;STASH FOR COUNTER AND START OF RAM
CODEX   ENDS

        END     START
```

Blocks

In fact, MS-DOS does a surprising amount for us. The first thing it does is to automatically parse the file name given to D.COM as an argument. An unopened file control block will appear at location 005CH in the current program segment all ready for the program to use.

A file control block is a string of thirty-two bytes which tells MS-DOS what file we are after and provides it with some scratch space. In this case, only the first twelve bytes matter to us. MS-DOS will be using the rest.

The first byte in the FCB is the drive specifier. If it's a zero it indicates that we'll be concerned with the current drive. If it's one it indicates drive A. Drive B would be two, and so on.

The next eleven bytes hold the file name and its extension. There's no period between them... the last three bytes of this field always contain the extension, so if the file name isn't eight characters long there'll be some spaces in there.

If the command line specified some wild cards... asterisks in the file name... DOS will create a file control block with question marks in it. Thus,

DOG*.ASM

would wind up in the file control block as

DOG?????ASM

In fact, when we type D and hit return what we are actually asking for is D *.*. MS-DOS is not quite clever enough to know this. It would create an FCB which asks for a file name which is eleven blanks. As such, D.COM knows that if the first character of the file control block is a space it has to fill in the file name with question marks.

Having created a valid file control block, the program can now start looking for directory entries which match the specification of the file name. If a single file name was specified the best it can hope for is to find one occurrence of it in the directory. However, if wild cards were used... or if no file name was given, the equivalent to all the characters being wild... there could be quite a few.

There are two DOS functions which handle the looking for of directory entries. The first one, function 11H, looks for the first occurrence of the file name specified in the file control block. The next, function 12H, when called repeatedly, looks for all the rest of the occurrences... assuming that the first one found at least one.

If either of these functions finds a file name that matches the specification in the file control block it copies what is called an *open* file control block... which, for our purposes means that the file name is definite, as opposed to having question marks in it... into memory at 0080H. The file name starts at 0081H... the first byte is the drive name... with other moderately useful stuff, like the file size... happening after it.

This stage of the program, then, consists of a loop to look for directory entries that match the name in the file control block and to move the names to some place safe... the aforementioned buffer.

The moving is handled by the subroutine SEEFILE.

Having done this, the next stage is to sort the names into alphabetic order. This isn't all that hard. It's done using a bubble sort, which is slow and crude but fairly effective for this sort of task.

In bubble sorting a list of names we look at each name and the one next in line to it. The first thing to do is to determine if they are in the correct order as they stand. If they're as they should be, we can move on to the next pair. If not, the program must swap the two entries... that is, the two open file control blocks, as opposed to just the names... and set a flag.

The flag's the thing. It has to be a proper full size dacron flag, as opposed to one of those boat pennants people hang from the antennas of restored '55 deSotos.

When the sort has worked its way through the whole list of names it checks to see if the flag has been set anywhere along the line. If it has the list gets sorted again. This will repeat until all the entries are in order.

They call it a bubble sort because the lower entries bubble up to the top of the list. The oddest things amuse mathematicians.

Forward Into the Glass

Having suitably ordered the list the next thing to do is to see what's happened. Displaying the information, as we noted before, is foolishly simple because everything is the same length. If we make each entry sixteen characters long we can get five to a line and everything automatically formats up quite easily.

The only tricky part about displaying the directory listing is in being able to figure out the size of the files. As we noted a while back, MS-DOS maintains a record of its file sizes down to the last byte. What's more, the files could... at least in theory... get rather large. The byte count lives in the opened file control block as an unsigned thirty-two bit word, or, for those of us who don't read the DOS manuals over Cheerios, as a number held in four bytes.

You may note that we preserved all thirty-two bytes of the opened file control blocks returned by the directory search functions, rather than just the names. This is because the file sizes are held in the last four bytes of each block... this is so inconvenient one supposes that it must have been done on purpose. It's a lot

easier to keep the whole string and sort things out later.

With the strings in memory the beginnings of the file control blocks are found at thirty-two byte intervals from the bottom of the buffer... DIRECT+2 in this thing... and the sizes twenty-eight bytes from the beginning of each block.

To make this a bit simpler, the first name and its associated flotsam lives at the end of the program. Count twenty-eight bytes past the end of the program and you'll have the first byte of the double word that holds the size.

Double words are very unpleasant to work with. However, in this case we don't have to deal with the whole troll, but, rather, just selected internal organs. Recall that we don't really want to know things down to the nearest byte, but, rather, to the nearest K. As such, we can ignore the least significant byte of this entirely. The next two bytes, if taken as a sixteen bit value, represent the number of quarters of a K in the file size. Divide this by two and we have number of halves of a K. Divide it again and we have the number of K's. The round is a bit flaky so we have to fudge this value somewhat.

Dividing a number by two in machine language is pretty easy. We could use the 8088's IDIV instruction, but it's fairly slow and, in this case, not necessary. Shifting the number to the right by two bits effectively divides it by four. You can see this happening in the LOOKIT subroutine.

If the resulting number is zero we obviously have a small file. In this case the program will get the two least significant bytes of the file size and display them as a decimal number of bytes.

Overbyte

The sorted directory program is a really useful thing to have on your disks. It doesn't take up much room and it makes checking out your bytes a lot quicker than would be the case in using DIR. If you are using subdirectories you can make it resident in all your directories by placing the command

```
PATH A:
```

in an AUTOEXEC file and keeping D.COM in the root directory.

While extremely simple to get together, utilities like this one are what really make one the lord and master... lady and mistress, perhaps... of one's hardware. I mean, you get D.COM going and you can have the thing flogged, beheaded, drawn, quartered and put to the wine rack if it even looks at you snarky.

They won't understand all this when you try to claim the destruction under warranty, of course, but it's a trip for a few minutes while the smoke is still flying. **CN!**

Apple Assembly Animation

Apple shape animation is fun. Slow, but fun. Here's a way to speed up those slogging shapes.

by John Rudzinski

Animation on the Apple is a tedious thing, made even more so if you approach it through BASIC programming. We can blame a lot of this tedium on the Apple's age... high resolution graphics have come a long way since 1978.

In BASIC, you're realistically limited to DRAWing and or XDRAWing vectored shapes. While you can POKE characters onto the hires screens and move them about through heavy calculations, the time BASIC takes to interpret your program is depressing. Add another character to the action and you lose your action. This method, sometimes called raster graphics, is fairly speedy in machine language, though, which is why most BASIC programs use shapes for animation and machine language programs use raster graphics.

That is, most machine language programs use them. Raster graphics have the unfortunate perchant for requiring pots of code, something we don't really have room for here. Another disadvantage is that fairly large graphic characters take a lot of calculation to move about. Shape animation... regardless of the shapes' sizes... requires less, as the Apple does the majority of the calculating. A blessing, this.

Disadvantages of animation through shape tables are inherent as well, mind. First, you have to create the shapes. If you've ever taken the time to plot a shape out on graph paper, translate the little squares into plotting or non-plotting vectors, then further translate the vectors into their three, or sometimes two, bit equates, then finally translate *those* into hexadecimal, you're probably reading this article in a rubber room. Heaven help you if you made a mistake somewhere along the line and your maple leaf shape ends up looking like a bowlful of perforated Jello...

The solution to that is to let a program do the work for you. There are a number of shape editors on the market, including Baudville's *Pixit* and the Beagle Brothers' *Apple Mechanic* to name but two. For the less financially blessed, a number of others are in the public domain, so hunt down a user group or a local Apple bulletin board.

Shape of Things to Come

You're probably wondering what the code that accompanies this article does. Program one is a small BASIC driver that creates, then BSAVEs a two-shape table to your disk. When implemented, the two shapes... an arrow and a radioactive grapefruit... BLOAD into $1000 and then wait until the binary program... program two... requires them.

Program two's purpose is a simple one. It first clears the text screen, announces that it's going to BLOAD SHAPEFILE, then does just that. Hires screens one and two are cleared and the address of the shape table ($1000) is stored in $E8 and $E9. HCOLOR and SCALE are then set, as is the shape pointer. Shape two... the radioactive grapefruit from an Atomic Energy of Canada worker's lunchbag... is then XDRAWn on both screens at 195,60. While HCOLOR needs only the original setup, SCALE needs to be refreshed often... *very* weird things happen if you don't.

The actual animation is accomplished with the arrow, shape one. After the arrow is XDRAWn at the far left of page two, it is displayed while another arrow is being XDRAWn, one pixel further right, on page one. As page one is shown, the arrow appears to have moved one pixel right, and the program enters a loop.

While page one is being displayed, the horizontal counter ACROSS1 is decremented so page two's arrow can be XDRAWn over itself, effectively erasing it. Then, ACROSS1 is incremented twice... once to make up for the previous decrement and once to supercede the arrow presently being displayed on page one. When the page is flipped, after the arrow is XDRAWn to its new horizontal location, the arrow appears to have moved another pixel to the right. The same deeds done to the hidden page two are done to the now hidden page one, with similar results... an advanced arrow when page one is displayed.

This loop doesn't terminate until the arrow has punctured the grapefruit, having moved 178 times to reach it. When this occurs, the speaker beeps and the arrow dissolves. Well, okay... the hires page flips. You're returned to BASIC at this point, and hitting the left-arrow and repeat keys together will eventually bring the prompt and cursor into view. You're left to contemplate the irradiated grapefruit.

```
0  REM SHAPE TABLE MAKER
1  FOR A = 4096 TO 4200: READ B: POKE A,B: NEXT A
2  PRINT  CHR$ (4);"BSAVESHAPEFILE,A$1000,L$68"
3  END
1000  DATA 2,0,6,0,61,0,13,41,9,9,9,9
1010  DATA 41,9,26,59,27,27,27,27,59,27,31,10
1020  DATA 9,45,45,45,45,45,45,45,26,59,27,27
1030  DATA 27,27,59,27,31,10,13,41,9,9,9,9
1040  DATA 41,9,26,27,27,27,27,27,27,27,27,10
1050  DATA 0,9,41,13,9,26,59,63,63,31,10,45
1060  DATA 41,45,45,26,63,63,63,63,10,45,45,9
1070  DATA 45,26,63,63,63,63,10,41,45,45,13,26
1080  DATA 27,59,31,27,10,0,0,0,0,0,0,0
```

Admittedly, the example could have been more exciting, with the arrow twisting about and the grapefruit breakdancing in anticipation of being speared, but this would have required a pile of shapes and a similar pile of DATA statements to be typed in. It should get the general idea across, though. You can speed the arrow up a bit... at the cost of extra page-flip flicker... by increasing the number of times ACROSS1 is decremented and in-

```
                    1   *
                    2   *     Shape Animation
                    3   *    through Assembly
                    4   *
                    5   *    By John Rudzinski
                    6   *
                    7   *      HennSoft 1985
                    8   *
                    9   *
                   10   BASIC    EQU  $E003
                   11   BEEP     EQU  $FF3A
                   12   CLSHGR   EQU  $F3F2
                   13   GRAPH    EQU  $C050
                   14   HIRES    EQU  $C057
                   15   HCOLOR   EQU  $F6F0
                   16   HOME     EQU  $FC58
                   17   HPOSN    EQU  $F411
                   18   MIXED    EQU  $C053
                   19   NOMIX    EQU  $C052
                   20   PPOINT   EQU  $E6
                   21   PRIME    EQU  $C054
                   22   SCALE    EQU  $E7
                   23   SECOND   EQU  $C055
                   24   SHADRL   EQU  $1A
                   25   SPOINT   EQU  $F730
                   26   STL      EQU  $E8
                   27   STROUT   EQU  $DB3A
                   28   XDRAW    EQU  $F65D
                   29   *
8000: 4C 36 80     30            JMP  START     ;Get your cycle hummin'
8003: 01           31   ACROSS1  DFB  #$01      ;Counter (shape 1 moves right)
8004: C3           32   ACROSS2  DFB  #$C3      ;Shape 2 at 195 locations across
8005: 3C           33   DOWN     DFB  #$3C      ;60 locations down (both shapes)
8006: CC CF C1     34   MSG      ASC  "LOADING SHAPEFILE ..."8D00
8009: C4 C9 CE C7 A0 D3 C8 C1
8011: D0 C5 C6 C9 CC C5 A0 AE
8019: AE AE 8D 00
801D: 84           35   MSG1     DFB  #$84      ;Control D
801E: C2 CC CF     36            ASC  "BLOAD SHAPEFILE,A$1000"8D00
8021: C1 C4 A0 D3 C8 C1 D0 C5
8029: C6 C9 CC C5 AC C1 A4 B1
8031: B0 B0 B0 8D 00
                   37   *
8036: 20 58 FC     38   START    JSR  HOME      ;Clear text screen
8039: A9 06        39            LDA  #<MSG     ;Low byte
803B: A0 80        40            LDY  #>MSG     ;High byte
803D: 20 3A DB     41            JSR  STROUT    ;Print message
8040: A9 1D        42            LDA  #<MSG1
8042: A0 80        43            LDY  #>MSG1
8044: 20 3A DB     44            JSR  STROUT    ;BLOAD shape table
8047: A9 20        45            LDA  #$20      ;Work on page 1...
8049: 85 E6        46            STA  PPOINT
804B: 20 10 81     47            JSR  PAGE1     ;Select page 1 hires
804E: 20 F2 F3     48            JSR  CLSHGR    ;and clear it
8051: A9 40        49            LDA  #$40      ;Work on page 2...
8053: 85 E6        50            STA  PPOINT
8055: 20 1D 81     51            JSR  PAGE2     ;and do the same
8058: 20 F2 F3     52            JSR  CLSHGR    ;with page 2.
805B: A0 00        53            LDY  #$00
805D: 84 E8        54            STY  STL
805F: A9 10        55            LDA  #$10
8061: 85 E9        56            STA  STL+1     ;Stick $1000 in $E8,$E9 pointer
8063: A9 01        57            LDA  #$01
8065: 85 E7        58            STA  SCALE     ;Set SCALE
8067: A2 03        59            LDX  #$03
8069: 20 F0 F6     60            JSR  HCOLOR    ;Set HCOLOR to white
806C: A9 20        61            LDA  #$20      ;While looking at page 2,
806E: 85 E6        62            STA  PPOINT    ;work on page 1.
8070: A2 02        63            LDX  #$02
8072: 20 30 F7     64            JSR  SPOINT    ;Point to shape 2
8075: A0 00        65            LDY  #$00
8077: AE 04 80     66            LDX  ACROSS2   ;Low byte (horizontal). Y (Hibyte) = 0
807A: AD 05 80     67            LDA  DOWN
807D: 20 11 F4     68            JSR  HPOSN     ;Set horizontal and vertical position
8080: 20 2A 81     69            JSR  DSETUP    ;XDRAW shape 2 on page 1
8083: 20 10 81     70            JSR  PAGE1     ;Show page 1
8086: A9 40        71            LDA  #$40
8088: 85 E6        72            STA  PPOINT    ;Work on page 2
808A: A2 02        73            LDX  #$02
808C: 20 30 F7     74            JSR  SPOINT
808F: A9 01        75            LDA  #$01
8091: 85 E7        76            STA  SCALE
8093: A0 00        77            LDY  #$00
8095: AE 04 80     78            LDX  ACROSS2
8098: AD 05 80     79            LDA  DOWN
809B: 20 11 F4     80            JSR  HPOSN
809E: 20 2A 81     81            JSR  DSETUP    ;Set up and XDRAW shape 2 on page 2
80A1: A2 01        82            LDX  #$01
80A3: 20 30 F7     83            JSR  SPOINT    ;Point to shape 1 (arrow)
80A6: 20 34 81     84            JSR  S1POS
80A9: 20 2A 81     85            JSR  DSETUP    ;Set up and XDRAW shape 1 on page 2
80AC: EE 03 80     86            INC  ACROSS1
80AF: 20 1D 81     87            JSR  PAGE2     ;Show page 2
80B2: A9 20        88            LDA  #$20
80B4: 85 E6        89            STA  PPOINT    ;Work on page 1
80B6: A2 01        90            LDX  #$01
80B8: 20 30 F7     91            JSR  SPOINT
80BB: 20 34 81     92            JSR  S1POS
80BE: 20 2A 81     93            JSR  DSETUP    ;XDRAW shape 1 on page 1
80C1: 20 10 81     94   SLOOP    JSR  PAGE1     ;Show page 1
80C4: A9 40        95            LDA  #$40
80C6: 85 E6        96            STA  PPOINT    ;Work on page 2
80C8: A2 01        97            LDX  #$01
80CA: 20 30 F7     98            JSR  SPOINT
80CD: CE 03 80     99            DEC  ACROSS1
80D0: 20 34 81    100            JSR  S1POS
80D3: 20 2A 81    101            JSR  DSETUP    ;Position, then erase shape (XDRAW)
80D6: EE 03 80    102            INC  ACROSS1
80D9: EE 03 80    103            INC  ACROSS1   ;Advance twice (once, really)
80DC: A2 01       104            LDX  #$01
80DE: 20 30 F7    105            JSR  SPOINT
80E1: 20 34 81    106            JSR  S1POS
80E4: 20 2A 81    107            JSR  DSETUP    ;XDRAW shape 1 in new position
80E7: 20 1D 81    108            JSR  PAGE2     ;Show results
80EA: A9 20       109            LDA  #$20
80EC: 85 E6       110            STA  PPOINT    ;Work on page 1
80EE: CE 03 80    111            DEC  ACROSS1
80F1: A2 01       112            LDX  #$01
80F3: 20 30 F7    113            JSR  SPOINT
80F6: 20 34 81    114            JSR  S1POS
80F9: 20 2A 81    115            JSR  DSETUP
80FC: EE 03 80    116            INC  ACROSS1
80FF: EE 03 80    117            INC  ACROSS1
8102: A2 01       118            LDX  #$01
8104: 20 30 F7    119            JSR  SPOINT
8107: 20 34 81    120            JSR  S1POS
810A: 20 2A 81    121            JSR  DSETUP
810D: 18          122            CLC
810E: 90 B1       123            BCC  SLOOP     ;Continue looping 'til collision.
                  124   *
8110: 2C 50 C0    125   PAGE1    BIT  GRAPH     ;Select graphics over text
8113: 2C 53 C0    126            BIT  MIXED     ;Show bottom of text page
8116: 2C 54 C0    127            BIT  PRIME     ;Page 1 ($2000-$3FFF)
8119: 2C 57 C0    128            BIT  HIRES     ;Select hires over lores
811C: 60          129            RTS            ;Done
                  130   *
811D: 2C 50 C0    131   PAGE2    BIT  GRAPH
8120: 2C 52 C0    132            BIT  NOMIX     ;Don't want to see $800 area garbage
8123: 2C 55 C0    133            BIT  SECOND    ;Select page 2 ($4000-$5FFF)
8126: 2C 57 C0    134            BIT  HIRES
8129: 60          135            RTS            ;Also done
812A: A6 1A       136   DSETUP   LDX  SHADRL
812C: A4 1B       137            LDY  SHADRL+1  ;Get low and high byte of shape address
812E: A9 00       138            LDA  #$00      ;Set up ROT to 0
8130: 20 5D F6    139            JSR  XDRAW     ;and XDRAW selected shape.
8133: 60          140            RTS
                  141   *
8134: A9 01       142   S1POS    LDA  #$01
8136: 85 E7       143            STA  SCALE     ;Set SCALE
8138: A0 00       144            LDY  #$00
813A: AE 03 80    145            LDX  ACROSS1   ;High and low horizontal position
813D: E0 B4       146            CPX  #$B4      ;Arrow XDRAWn at 179,60 yet?
813F: F0 07       147            BEQ  END       ;Yes. Done.
8141: AD 05 80    148            LDA  DOWN      ;Get vertical position
8144: 20 11 F4    149            JSR  HPOSN     ;and set both positions.
8147: 60          150            RTS
8148: 20 3A FF    151   END      JSR  BEEP
814B: 20 10 81    152            JSR  PAGE1     ;Ensure on page 1, then
814E: 4C 03 E0    153            JMP  BASIC     ;back to Applesoft.


--End assembly, 337 bytes, Errors: 0
```

cremented. Keep the INCs and the DECs constant, though, or the arrow will fly erratically.

XDRAW, Pardner...

To get the 337 bytes of program two happening, you'll either need an assembler or the fortitude to type all the hex numbers appearing at the listing's left side into your monitor. If you choose the latter method, type CALL -151 and rattle them in, finishing with

BSAVE ASMSHAPE,A$8000,L$151

If you choose the easy way out, any assembler should do the trick. I use Roger Wagner Publishing's *Merlin*, but trusty EDASM on Apple's DOS Toolkit disk will be just as effective.

You won't be able to re-run this program after it's run its course with an 8000G from the monitor. You'll have to BRUN it again from disk. Apple shapes share integral zero page addresses with BASIC and DOS, and the shapes lose out on the Apple priority list. Incidentally, be sure that SHAPEFILE, the file created by program one, is on the same disk as program two or program two will bomb out with a FILE NOT FOUND error.

Handling Apple shape animation and DOS commands through assembly language is nothing new, nor is it all that glamourous... you won't make page one of the Globe and Mail. You will, however, lessen your dependence on BASIC... a sure mention in the lifestyle section. **CN!**

Tandy 200 Review

Small enough to fit easily into the pockets of people twenty-eight feet tall or larger, the Tandy 200 is a really nice portable system.

by Steve Rimmer

By the time they started coming up with really powerful, useable portable computers I was pretty sure I wasn't still up for having one. I used to have visions of being able to take the thing anywhere and write with it... polish off the latest draft of the novel out in the woods somewhere. However, time passed, Dutch Elm disease hit the trees so you can see the Macdonalds from pretty well anywhere in there now and my eyes started to get positively enamoured of phosphor rather than liquid crystals.

This is all very unfortunate, of course, because some of the portables that have turned up in the last little while have been slick as Richard Nixon's lawyers. Far removed from those early boxes that could display twenty characters at a time on very slightly enlarged calculator displays, the latest generation of portable computers is starting to approach the capabilities of some of the desktop machines. However, in addition to all this they are extremely mobile and they have a few unusual features of their own.

The Tandy 200 is the newest portable machine from the boys that brought us hairy radios. In some ways an outgrowth of the Model 100 which we looked at some time ago, it features a much larger display screen and a lot of very trendy software in ROM. Furthermore, it can actually do productive work without the use of several metric tonnes of optional... and highly unportable... accessories.

The Tandy 200 is among the most useable portables I've checked out to date.

Footloose

The Tandy 200 is built in a sort of rococo Hewlett-Packard style, being similar in design to the HP Portable. It's about the size of a large book, with a top which flips up to uncover the keyboard and transmute itself into a screen. This allows the liquid crystal display to be set at any reasonable angle, an important consideration as these things have severely restricted viewing angles... especially in low light.

The Tandy's display is splendid in bright sunlight, workable in the normal ambient light of an office but very uncomfortable if it's lit by a sole incandescent lamp. Unlike the display produced by a normal cathode ray tube, a liquid crystal doesn't generate any illumination of its own. It only reflects the available light... which means that a dark room will avail one of a dark display.

One gets sixteen lines of forty characters on this non-tube. This still isn't up to the density of a desktop system but it's adequate for quite a lot of stuff.

The system's keyboard is pretty good... it consists of a full sized QWERTY arrangement with four cursor mover keys and twelve smaller, calculator keys up top to handle special functions. The keys have a somewhat lighter touch than one might otherwise want, but you can get used to this if you aren't used to typing with your fists.

As with most portable computers, the Tandy can be powered from a plug pack or its own internal batteries... there's a secret trap door in the bottom which hides four AA cells. However, when it is unplugged or switched off its batteries are still ticking it over, keeping its processer awake and refreshing its memory. As such, nothing stored in the computer is lost when the system is shut down. One can, for example, be halfway through a word processing document, go for munchies and come back to exactly where one was... all without a single disk access.

This is good... because the Tandy doesn't really have disks. Taking advantage of its perpetual RAM, it saves its files in a memory cache. While this behaves like a real disk drive, it is obviously massively faster.

Unlike as in the case of the Hewlett-Packard portable, the Tandy doesn't run MS-DOS, or, in fact, any operating system per se. It has its own menu driven thing... something custom from the dungeons of Microsoft... which allows one to manipulate files and run the available applications. While this is not as flexible as the Hewlett-Packard MS-DOS and PAM system... and it means that any software one adds to the system must be custom written for it from the ground up... it is splendidly simple to use. The average initial think for the main menu probably averages less than a minute even if the manual got eaten by gophers.

The menu consists of the names of the applications the thing is holding plus all the files they've generated. There's a cursor which one can move over the names with the cursor mover keys. If one hits return when the cursor is eyeing an application the system will run the appropriate program. If you zap a file name instead, the Tandy will run the application that created it and load in the appropriate file. Thus, for example,

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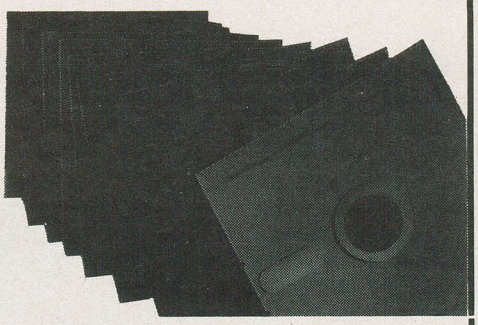

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selecting a word processing document would run TEXT, the built in word processor, and then load up the document.

The system comes with a reasonably intelligent selection of applications. There is, to begin with, a moderately powerful implementation of Microsoft BASIC. There's also the aforementioned TEXT word processor, TELCOM, a terminal package, and a really cute version of the Multiplan spreadsheet. Finally, there are a note pad and an address minder... they're harmless if you leave them alone. We'll scrutinize some of these packages momentarily.

The rest of the hardware of the Tandy 200 is a bit mundane... but there's enough of it to handle most of the things one wants to do on a computer of this size. This includes a printer port, a cassette jack, a system bus expansion connector, a build in low speed modem and a serial port.

BASIC Headspace

The BASIC for the Tandy 200, while well debugged and moderately decent, is none the less quite obviously severely stripped down. It has all of the essentials but very few of the luxuries... probably a fair trade considering the generally diminutive nature of the machine.

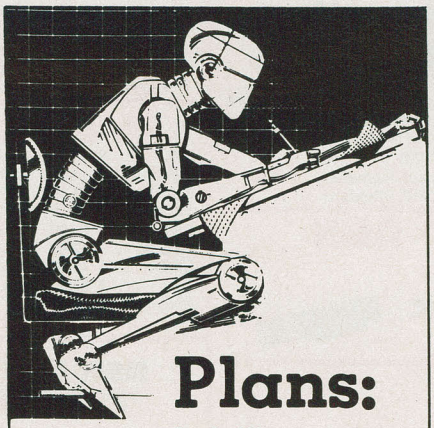
The sorts of things that are lacking in the BASIC are line renumbering, full screen editing... there's an EDIT function, but it takes some getting used to... a facility to set the minimum dimension of arrays and so on. On the other hand, there are high resolution graphics statements in there... you can pop dots and lines and so on all over the liquid crystal display. Likewise, one can cause the speaker to peep the sounds of one's choice programmatically.

The BASIC itself is pretty snappy... it will run benchmarks that are processor intensive quite quickly. In more conventional terms... words you wouldn't be embarrassed to use at a cat bashing festival... this means that if the thing has to sit there and think a lot to figure out an answer it's pretty lively. The catch is in its dealing with the outside world.

One of the severe restrictions inherent in liquid crystal displays is that they are fiendishly slow. They've gotten a lot better of late, but they still like to take their own sweet time. As such, the video of the Tandy 200 does not update itself all that quickly. If, for example, you write a program which does a lot of high resolution plotting you can expect it to take its own sweet time.

That's real sweet, as opposed to Nutrasweet.

The one uncomfortable aspect of the Tandy 200's BASIC is the book which comes with it. For one thing, it's incredibly small... smaller even than the rest of the system's books, which are pretty tiny themselves. Measuring in at about four by six inches, it is difficult to flip though and its contents are terse at the best of times.



Plans:

System:	**Tandy 200**
Operating System:	**Proprietary**
RAM:	**24K**
Storage:	**CMOS RAM, optional cassette**
Screen Format:	**40x16 LCD**
Software Included:	**BASIC, TEXT, TELCOM, MultiPlan**
Manufacturer:	**Tandy Electronics Limited**
Available From:	**Local Radio Shacks**
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Other Plans

The terminal package which comes with the thing... it shows up as TELCOM on the menu... is a pretty decent little toad, although it, too, entails a few compromises to shoehorn it into the available space. It combines a number of similar functions.

The Tandy 200 has both a built in modem and a serial port which could be used to talk to another... presumably faster... modem or another computer over a hard wire link. TELCOM will deal with either.

Telling TELCOM what it's to be about is handled through an extremely cryptic parameter block that gets passed to the thing whenever one wants to change its space. This decides which serial device one is going to be using, what its protocol will be and so forth. These things are, I think, unnecessarily bizarre... expect to have to dance them about for a while before you get the complete hang of them.

Far more than just being a dumb terminal, the TELCOM application does a lot of very useful stuff. It will, for example, autodial through its internal modem... but not through a smart modem attached to its serial port. It will also upload and download files by means of a straight ASCII dump. This works very well over a hard wire link... but not quite so well over a modem, which will usually avail one of the odd garbled character unless the phone line is really pristine.

It would have been more profoundly cool if the thing had supported XMODEM transfers, as did the Hewlett-Packard portable.

The word processor... TEXT on the menu... is unusually uncomplicated in operation. One simply types stuff into it and edits what one has typed by cursoring around the screen. However, there are things like block manipulations and search and replace in there if they're called for.

As with all of the applications under the Tandy 200, the word processor can have a set of function key labels displayed at the bottom of the screen should one become lost.

The size of the document that TEXT can handle is proportional to the amount of free RAM the system can scare up at the time. In all fairness, a stock Tandy 200 doesn't offer it a great deal of memory, and the "memory full" message is a common troll of this application. At this point, one must either trash some documents or banish them to some sort of mass storage device. The system is a bit inelegant when the crunch comes.

Multiplan is equally well thought out. It isn't as powerful as authentic disk based Multiplan but it is pretty good. The system's memory requirements mean that one can't get really complex spreadsheets into it, but it did acquit itself nicely on the small ones. A spreadsheet is one of those applications which is more processor intensive than screen intensive... the speed of the computer lurking behind that lazy screen is apparent in running Multiplan. Its recalculations are pretty snappy.

Trolls of Fort Worth

The Tandy 200 is a good computer for a fairly specific stratum of users. It wouldn't, for example, be particularly good system to buy if you are looking for a top down system to do the usual things people do on computers. There is little software available for it, it doesn't have a lot of room for expansion and it's not really all that powerful in real terms. Its applications do rather well under the circumstances... they're pretty tight as software for portables go... but they wouldn't cut it beside comparable software for desktop system.

The system as a whole is well constructed, nicely thought out and seems to be without bugs. It isn't ruinously expensive and, of course, it's easy to find.

I think I'll wait for one that comes with its own watch strap. **CN!**

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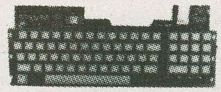

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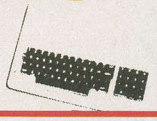
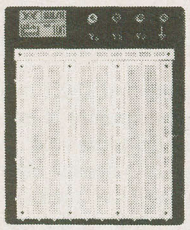
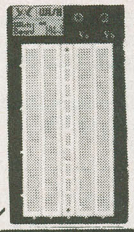
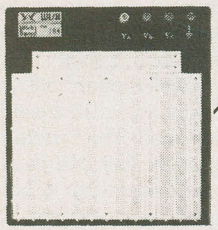
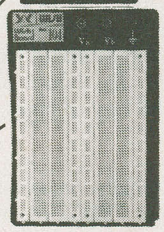


SOLDERLESS BREADBOARD









Solderless prototyping boards are the best way to quickly breadboard up a circuit. The holes are made especially for IC's, resistors, and other small parts with 22-28 gage wire leads, takes WW pins too.

WB-106 .....**$42.95**
3 IC strips, 5 power strips
4 Binding posts, Aluminum plate
WB-104-3 .....**$29.95**
2 IC strips, 1 power strip
2 Binding posts, aluminum plate
WB-108 .....**$59.95**
4 IC strips, 7 power strips
4 Binding posts, aluminum plate
WB-104 .....**$33.95**
2 IC strips, 4 power strips
2 Binding posts, aluminum plate.

This is a high quality Hall Effect keyboard made by Microswitch of Canada for AES data and now bought by us for 10% of the $169.00 that AES paid for them in 10,000 lots. They are a very good word processing keyboard with both serial and parallel data outputs for use with APPLE and IBM type systems and come complete with a ribbon cable connector and complete pinout. **$24.95**

WIRED CARDS

16K	$ 45.00	Applaext 128K	$140.00
128K no IC	$ 34.95	Sprite gr.	$ 69.95
128K OK	$ 55.00	TMS9918A IC	$ 18.95
128 64K	$ 99.00	DISC SHMRCK	$ 45.00
128K 128K	$150.00	80 Column	$ 65.00
MC3242 IC	$ 12.00	80 Col. Sofsw	$ 69.00
DISC	$ 45.00	Grippler	$ 50.00
Z-80	$ 45.00	Grip cable	$ 19.95
Applacard	$150.00		

NEW LOW BARE PCB PRICES*

- Real time clock
- Rana 4 drive
- 9 V Music
- Disc Controller
- Disc Controller (Shamrock)
- PIA card
- EPROM
- WILD CARD
- SAM TALKS
- COMMUNICATIONS

GROUP 2 **$9.00 each**

- Grippler
- 80 Column
- 80 Column Soft Switch
- Z-80
- RGB
- Sprite graphics
- APPLACARD 128K ADD ON

GROUP 3 **$11.00 each**

• SSM MODEM • APPLACARD • APPARAT EPROM PROG • 16K • 128K

All boards come with a parts list and placement diagram. We have all the parts of the PCB's just ask for them.

***Prices so low we require payment with order**

MEMORY FLASH

256K-150Ns DRAM **$19.75**
64K-150Ns DRAM .....**$ 2.49**
64K-200Ns DRAM .....**$ 2.89**
Prime stock, limited quantity.

KEYTRONICS

PROGRAMMABLE KEYBOARD
An excellent ASCII Keyboard, fully Apple Compatible. Full size with numeric pad, fully programmable key switches with full data **49.95**

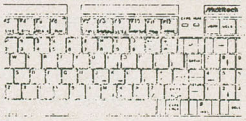
POWER SUPPLY

CSA APPROVED
Our Famous "BLACK BEAUTY" power supply, now reduced in price but not in quality. Our ratings are 5V-5A; 12V-2.5A; 5A-1/2 A; -12V-1/2A for real **$79.95**

OUR 6502 BOARD

Now only $29.95 still with all the versatility of the original and a full 8 slots.

APPLE® DETACHED KEYBOARD $159.00



The excellant MAK-II Apple detached keyboard using serial cata (IBM) format. Plugs directly into Apple PCB

GREAT DEAL

THE GREAT DEAL CARRIES ON FOREVER AND GETS BETTER

Our proven 6502 motherboard plus a numeric case plus a black beauty power-supply plus a numeric function keyboard plus any 4 bare pcb for **$225.00**

CONNECTORS

DB SERIES

DB-25 M solder	$1.95
DB-25 F solder	$1.95
DB-25 M IDC, Flat cable	$5.95
DB-25 F IDC, Flat cable	$5.95
DB-25 M Right angle PCB	$4.95
DB-25 F Right angle PCB	$4.95
DB-25 Shell	$1.00
DB-15 M solder	$1.95
DB-15 F solder	$1.95
DB-15 F IDC, flat cable	$3.95
DB-15 M right angle PCB	$2.95
DB-15 F right angle PCB	$2.95
DB-15 Shell	$1.00
DB-9 M solder	$1.75
DB-9 F solder	$1.75
DB-9 M right angle PCB	$2.50
DB-9 F right angle PCB	$2.50
DB-9 Shell	$0.75

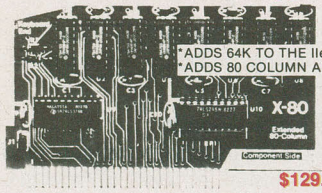
DRIVE CONNECTORS

50 Pin Edge C, 8" drive	$5.95
40 Pin Edge C,	$4.95
34 Pin Edge C, 5-1/4" drive	$5.95
20 Pin Edge C, Hard drive	$4.95
34 Pin Fem header 17 x 2	$3.50
26 Pin Fem header 13 x 2	$3.00
20 Pin Fem header 10 x 2	$2.00

ASSORTED SEMI-CONDUCTORS AND OTHER STUFF

(A) RED LED S/M/L	10/$1.00
(B) GREEN LED S/M/L	8/$1.00
(C) AMBER LED S/M/L	8/$1.00
(D) PIN PHOTODIODES, INFRA-RED	2/$1.00
(E) PHOTO TRANSISTOR, NPN VISIBLE	2/$1.00
(F) LDR (LIGHT DEP RESISTOR)	$1.00
(G) FET ELECTRET MIKE, TINY 10MM	$2.00
(H) 1N4001	10/$1.00
(I) 1N4004	8/$1.00
(J) 1N4007	6/$1.00
(K) 25AMP-600V BRIDGE	$2.95
(L) 25AMP-600V BRIDGE	$3.50
(M) 6AMP-200V BRIDGE	$1.50
(N) 3AMP-200V BRIDGE	$1.00
(O) DIODE 3AMP-600V	3/$1.00
(P) 1N914/1N4148 Silicon diode	10/$1.00
(Q) 7805 1AMP-5V regulator	2/$1.00
(R) 7812 1AMP-12V regulator	$0.75
(S) 78M12 ½AMP-12V regulator	2/$1.00
(T) LM317 Variable 1AMP regulator	$1.50
(U) LM323 5V 3AMP regulator	$2.95
(V) LM350 Variable 3AMP reg.	$3.95
(W) 2½" 80hm mini speaker	$1.50
(X) MINI TOGGLE SWITCH SPDT	$1.95
(Y) MINI PUSH BUTTON SWITCH, NO	$0.50

EXTENDED 80 COLUMN for Apple IIe

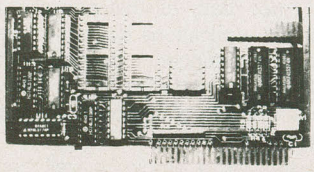


$129.00

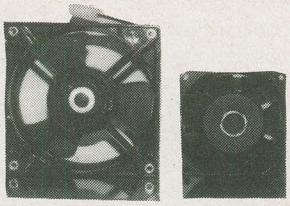
"NICE PRINT" APPLE II + , IIe CARD

An APPLE II +, APPLE IIe precision parallel printer card for use with EPSON and GEMINI (and similar) to generate multiple fonts, sizes and near letter quality printing. The printer steppers are controlled to give multiple and incremental strike capability to achieve the above.

COMPLETE WITH CABLE **$119.00**



FANS FANS FANS

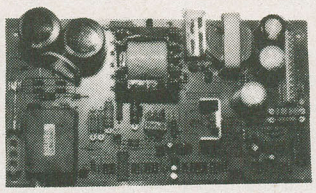


Has your IBM look-a-like system started to make funny grinding noises as the Taiwanese fan bearings start to run out of oil, if you have oil-no problem, but unless you do something the neighbours will soon call the police. We got some nice American fans, in 3" and 4¼" sizes 110 Volt new and like new from equipment (checked)

3" NEW **$14.95**
4¾" NEW **$14.95**
3" USED .....**$ 9.95**
4¼" USED .....**$ 9.95**

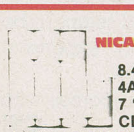
Since they are American they last forever.

IBM POWER SUPPLY



One of the nicest open frame IBM type switching power supplies we have ever seen. Came from the defunct NCR IBM compatible. runs the whole thing, has +5V-7A, +12V-3A, -5, -12-¼A. A very good unit for starter system. Will not run hard disc system. A real Steal at **$49.95**

NICADS



8.4V
4A.H
7 "D" CELLS

A great buy, a pack of 7 brand new GE NICADS giving 8.4v at 4 Amp hours. Each cell is 1.2v and separates easy. Used as 5V backup through a 7805. Gives 5v 1 Amp for 4 hours **$14.95**

TRANSFORMERS

A) Make an IBM linear supply good for 250 Watts. This unit gives +5v @ 20Amps +12v @ 10Amps and −5, 12 @ 1Amps. Unit gives the proper AC for above **$19.95**
(B) 8VAC 5Amp ..... **$ 9.95**
(C) 8VAC, 5A, 25VAC, CT, 2.4A **$14.95**
(D) 12VAC ½ Amp ..... **$ 2.50**
(E) 24VAC, 4Amps **$12.95**
(F) 500 WATT ISOLATION/STEP UP/DOWN 110/220, 20 Lbs freight . **$24.95**
(G) 12VAC 3Amp ..... **$ 7.95**
(H) 8V 12A, 25VCT, 3.4A, 22V, 4A made for a fully stuffed S-100 system . . **$24.95**

SWITCHING POWER SUPPLY

Another great bargain from PARTS GALORE, A small power supply switching style that give +5v−4A; ±12v 1A and −5v (adjustable) on a compact 4x8" open frame PCB. Cost Northern Telecom $50.00 when they bought 5000 pieces. We got em when a subcontractor went belly up for 10% of that price and we are selling em for

$18.95 NEW IN BOX TESTED

AC power cable (3 Wire) for above **$2.50**

Circle No. 4 on Reader Service Card

COMPUTER PARTS GALORE INC.
316 College St.
Toronto, Ontario M5T 1S3

Toll Free Orders Only
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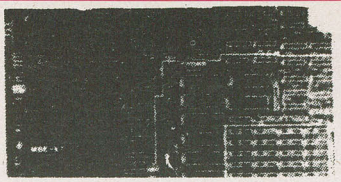
Order Checking (416)925-8291
Technical Data (416)925-1105

MAIL ORDERS: We accept VISA; MC; AMEX; credit cards. Money orders, cheques (2 week wait) are also OK. Minimum packing and handling fee $5.00 or 5%, whichever is larger. The only COD we use is via CANPAR (Add $4.00 COD fee) or motor freight. We do not use postal COD at all. All Ont. res. add 7%. All prices are subject to change without notice. Returns are subject to a 20% restocking charge.

MBE-XT
AN IBM® XT Compatible 8 Slot Motherboard



MBE-XT BARE PCB WITH MANUAL AND SCHEMATICS.
$49.95

LAZY BOARD

What is your time worth?? We have had a bunch of MBE-XT boards stuffed and wave soldered so you can save all that time soldering them up. All you need are the IC's memory and BIOS and you are set to go **169.00**

FULLY WIRED AND TESTED WITH 64K ON BOARD WITH MEGABIOS AND MANUAL
$365.00

- 8088 16 Bit Microprocessor
- 8087 Math Processor. Optional
- Up to 256K Dram on Board
- Has Digital Delay Line for Error Free Memory Refresh
- 8 IBM Compatible Expansion Slots
- 4 DMA and Timer Channels
- 64K/128K Eproms Jumper Selectable
- Will run any Compatible BASIC
- IBM Power Plug Compatible
- Same PCB size as IBM XT
- Runs PC-DOS and CPM-86
- Compatible BIOS in stock

DTC DISPLAY TELECOMMUNICATIONS CORPORATION — NEW!
MEGA-BOARD

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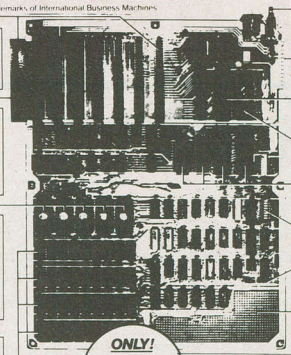


- **Standard Keyboard Interface** (Full PC compatible)
- **Hardware Reset** (Overcomes reset flaw in PC)
- **Power Connector** (Full IBM* pinout compatible)
- **8088 Processor** (Same as PC)
- **8087 Numeric Processor** (Same as PC)
- **Peripheral Support Circuits** (Same as PC)
- **Configuration Switches** (Same as PC)
- **Speaker/Audio Port** (Same as PC)
- **Wire Wrap Area** To facilitate special custom applications*
- **Eight Compatible I/O Interface Connectors** (Full PC compatible) (compatible with all IBM-PC* plug-in cards)
- **Special J1 Interface** (Allows horizontal mounting of compatible expansion cards for easy bus expansion and custom configuring) (Board has 62 pin gold plated compatible connector)
- **Extended ROM Capability** (Runs all compatible PC ROMS) (Jumper programmable to accommodate all popular 8K, 16K, 32K and 64K ROM chips and NEW EE ROMS/ VPP power pin available for EP ROM burning*) (External VPP voltage required)
- **Board Size** 10.5 inch X 13.5 inch
- **Full Mega-Byte Ram Capacity! On board!** (With parity) 256K Bytes using 64K chips 1 Mega Bytes using 256K chips

ORDER NOW!!!

ONLY! **$99.95** Evaluation Board Kit

MEGA-BOARD™ Evaluation Board Kit! (Blank board with full assembly instructions and parts list.)

Includes highest quality PC board with gold plating, silk screen, solder mask

CHERRY IBM® STYLE KEYBOARD $124.00

At last a good low cost keyboard for the IBM PC, XT or compatible machine. Uses capacitive keys, has a very good feel", and has TYPEWRITER LAYOUT for easy word-processing at the very low price of **$124.00**

MEGA BIOS

The amazing MEGABIOS® from DTC of Dallas. A fully rewritten BIOS that allows you to make a fully compatible legal system. Note they do not ask MEGABUCKS® for it, only ...**$29.95**

TAIWAN BIOS, not as good or 100% compatible but it will get you running and save you bucks **$19.95**

TAIWAN BASIC, in 4 2764 EPROMS **$49.95**

IBM BARE PCB

(A) Color Graphics (Persyst)	$27.95
(B) Monochrome graphics	$24.95
(C) Disc controller	$17.95
(D) Disc controller + Printer	$24.95
(E) Disc controller + Game	$24.95
(F) IO + 2 I/O clock etc.	$24.95
(G) Multifunction card 11 function	$24.95
(H) AST SIXPACK COPY	$34.95
(I) Parallel printer	$17.95
(J) RS-232 card	$17.95
(K) Simple modem card	$17.95
(L) Disc for above	$ 8.00
(M) 512K card	$24.95
(N) 256K short card	$19.95
(O) IBM 6" extender for service	$19.95
(P) WW Proto, full sized with DB-9 & DB25 footprint	$24.95
(Q) WW Memory proto, full sized with 256K (1Meg) memory laid out on one end with DB-9, DB25 footprint	$29.95
(R) 512K Mapping PROM	$12.95
(S) Multifunction PROMS(2)	$24.95
(T) 2732 for color graphic	$10.00

All cards come with a detailed parts list and placement drawing, we also have all parts needed for them.

MBE-XT

MBE-XT Motherboard, wave soldered with no IC's at all with manual and schematics **$169.00**

As above with 64K, no BIOS, tested with all IC's and fully burned in, 8 Slots **$325.00**

BASIC SYSTEM, MBE-XT, A & T with 256K with one 360K drive & controller with power supply, hinged lid case and MEGA-BIOS **$895.00**

MBE-XT SYSTEM +, The fully loaded MBE-XT system with 256K on board, BIOS, Cherry keyboard, color graphics, 2-360K DSDD Drives with controller and serial, parallel ports, calendar, clock and many more small features, fully tested, ready to go **$1599.00**

MEGABOARD

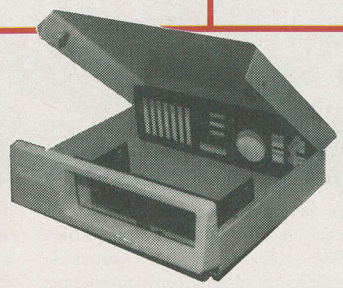
MEGABOARD Motherboard, Wave soldered with no IC's at all with parts list and schematics **$195.00**

MEGABOARD Motherboard, Wave soldered with all IC's and 64K on board, with schematics and test data, no BIOS but fully burned in and tested with one ...**$399.00**

BASIC SYSTEM, MEGABORD, A & T with 256K (256K DRAMS) with one 360K DSDD Drive & controller with power supply and hinged lid case, and megabios **$995.00**

MEGABOARD SYSTEM +. The fully loaded MEGABOARD with 640K on board (256K & 64K DRAM) with 2-360K DSDD drives and controller, color graphics board, with serial, parallel, clock, calendar, and many small features fully tested and ready to go ... **$1999.00**

IBM CASE



We have the nicest case of all the various competing cases, ask any friend who has bought someone else's case and then has seen ours. The lid is hinged with pushbutton access. The back is cut for 8 XT slots and it comes with all the case back inserts for cards, card guides, blind disc filler plates, standoffs, feet, screws, all for .**$89.95**

Please specify back or side cutour for power supply.

We also have an economy version ABS case, visually exactly the same, but of cheaper build **$69.95**

We also have an IBM 8 Slot/6502 Board dual duty case for making IBM look-a-like 6502 systems **$69.95**

MEGABOARD CASE, similar to the above, but no pushbuttons or hardware, from DTC in Dallas Texas. A stronger US made case, but less finishing parts. Fits the MEGABOARD exactly with side cut extender, for back power supply **$99.00**

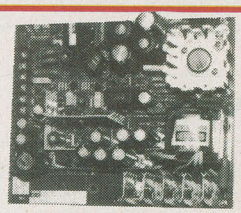
SWITCHING POWER SUPPLY

110V, 60Hz with Fan and two rear switched outlets.

These power supplies fit our cases.
100 WATT +5v-10A; + 12v-3.5A; ± 12V-1/2A **$139.00**
130 WATT +5V-14A; + 12v-4.2A; ± 12V-1/2A **$169.00**
Please specify, side or back switch

8" DRIVE SWITCHING POWER SUPPLY

$39.95



The greatest 8" Drive supply we have ever found. Has 24V-2.2A 5V-3A and -12V-.17A. All you need for a dual 8" Drive system. A switching power supply by ASTEC ...**$39.95**

PARTS, PARTS, PARTS, PARTS

Hard to get parts for your IBM compatable (8088) systems and peripherals

8088 CPU	$14.95
8087 Math Processor	$219.00
8237A-5 Prog. DMA Cntrl.	$14.95
8250 Serial Port	$11.50
8253A-5 Prog. Interval timer	$7.50
8255A-5 P.I.A.	$6.95
8259A Prog. Interrupt Cntrl.	$6.95
8284A ADC clock gen & driver	$7.75
8288 Bus Controller	$15.50
8272 Floppy Disk Controller	$14.95
NEC 765 Floppy Disk Controller (equivalent to 8272)	$14.95
Set of 8088, 8255A-5, 8237A-5, 8288, 8284, 8253A-5 and 8259A	$69.00

All parts (except NEC765) are prime parts made by Intel.

DELAY LINES

100ns delay line	$6.00
7ns delay line	$13.95
62 pin edge con (high quality)	$2.40
5 pin Din conn	$1.25
Power conn	$1.25
Dip switch 8 pos	$2.49
4.7k x 6 sip	$ .69
4.7k x 8 pin sip	$ .69
8.2k or 10k 16 pin Resistor or network	$ .99
33ohm x 8 network	$1.10
Small speaker	$1.99
.1 uf 50V high quality bypass capacitors	$ .10
Trimcap	$ .99
34 pin card edge con. for your floppy controller	$5.95

LS for IBM Systems

00	$0.39
02	$0.39
04	$0.39
08	$0.39
10	$0.45
20	$0.45
27	$0.45
30	$0.45
32	$0.80
74	$0.50
138	$0.70
158	$0.75
175	$0.80
243	$1.20
244	$1.25
245	$1.50
273	$1.50
322A	$6.00
323	$3.50
373	$1.40
374	$1.40
377	$1.25
670	$1.75
7407 TTL	$1.00

S SERIES

S00	$0.75
S02	$0.75
S04	$0.75
S08	$0.75
S74	$0.85
S138	$1.75
S157	$1.85
S158	$1.85
S374	$3.25

MISC

75477	$1.25

Hard to get parts for your 6502 Systems and Apple Compatible Peripherals.

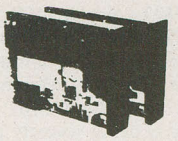
6502 CPU	$ 5.50
6845 CRT controller	$ 9.50
68A45 CRT controller	$ 9.95
Z80A CPU (4 MHz)	$ 4.99
MC3242	$11.95
74LS367	$ .62
74LS259	$ 1.39
74LS161	$ .99
74S74	$ .82
74S174	$ 1.70
74LS323	$ 4.55
Card edge connector (50 pin)	$ 2.49
RCA jack PC mount	$ .69
6 pin power square connector	$ .99
Phono jack (small)	$ .99
MPSA 13 trans	$ .55
2N3904 trans	$ .19
2N3906 trans	$ .27
MPSU51 trans	$ .79
2N4258 transistor or equiv	$ .69
1K SIP 10 pin	$ .69
1K SIP 8 pin	$ .69
10K SIP 10 pin	$ .75
4 pos dip sw	$ .95
20 pin female header for disk drive	$ 1.79
20 pin male	$ 1.69
50 pf trim cap	$ .89
220 ohm trimpot	$ .69
20 conductor ribbon cable	$ .89/ft.

MONOLITHIC CAPS

MONOLITHIC CERAMIC CAPS
We bought 100,000 of em dirt cheap, they are very good quality, 63V, 0.2" lead spacing. Now only **10¢ ea.**
50 pcs. .....**$ 5.00**
100 pcs. .....**$ 9.00**
1000 pcs. **$85.00**
more? ask!

WE'VE GOT EM!

5-1/4" HALF SIZE DRIVES! For IBM PC, TI PC, XEROX 820



Shugart/Panasonic ½ size SA455-3AEC **$189.00**

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COMPUTER PRESS

IBM News

TORONTO, ONTARIO — A short while after the American announcement of the PCjr's discontinuation, *IBM Canada Limited* has introduced two new models of the IBM PC/XT and has announced price changes on selected PCs and options.

Model 068 is a one 360K drive system with 256K. The unit may be upgraded by the addition of another 360K floppy or a 10 megabyte hard drive. *Model 078* also has 256K RAM, but has two 360K floppies. A 10 megabyte hard drive may be substituted for one of the floppies when upgrading. Prices for the new models are quoted at $3699.00 for the single drive unit, and $4199.00 for the dual drive XT.

Prices of existing PC/XT models have been reduced. The 128K PC/XT with one 360K floppy and a 10 megabyte hard drive now retails for $6149.00 — down from $6575.00 — and the similar unit with 256K has been reduced from $6760.00 to $6349.00.

Most of the prices in the IBM PC family have increased, however. The basic PC/AT's retail has increased from $6149.00 to $6649.00, while the enhanced PC/AT now retails for $9449.00, up from $8195.00. The vanilla IBM PC, with 64K and no disk drive has increased in price from $1995.00 to $2269.00. While retail pricing for the 256K PC with one 360K drive increased from $3069.00 to $3249.00, the price for the 256K model with two 360K drives is unchanged. Similarly unaffected by the price changes are the PCjr and the Portable PC.

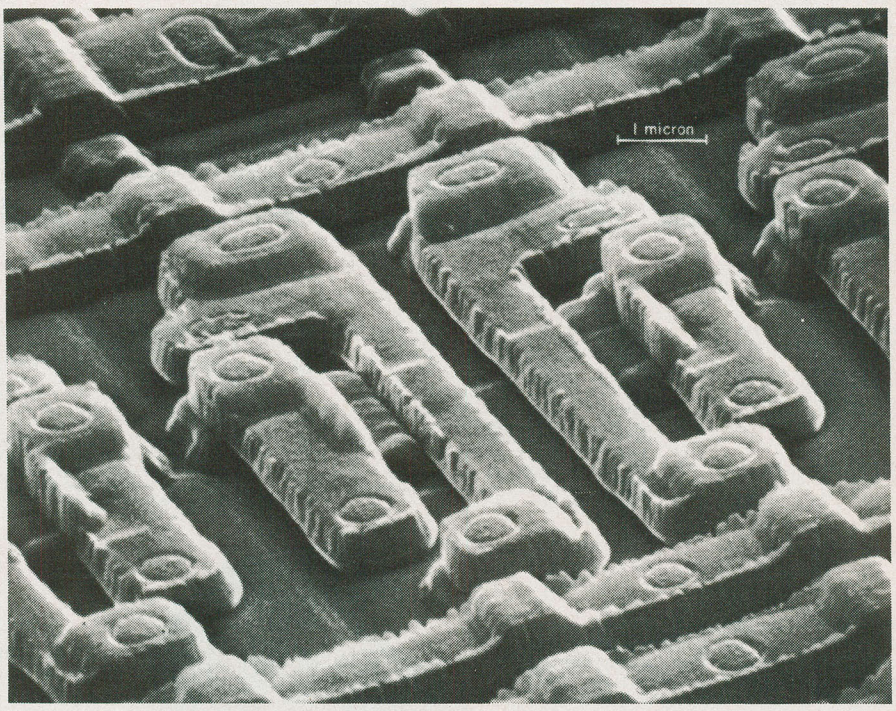
Notes

COMPUTING NOW! — Although we didn't know it at the time the *Built In Canada* article in our April 1985 edition was written, the **JLS CP/M Big Board** is still available. The powerful single board system, along with a much-enhanced BIOS and pots of support can be obtained from *Micro/Access*, Box 137, Station V, Toronto, Ontario M6R 3A4 (416) 537-7843 voice or (416) 536-5843 modem.

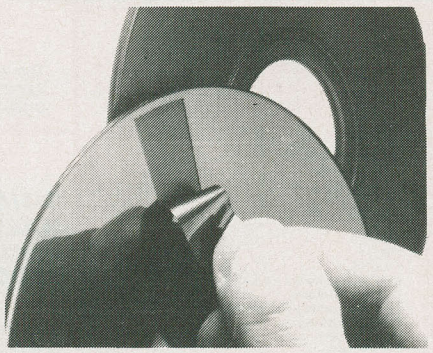
Those who read *Boxes of Blues* in our May 1985 issue may have noticed an example lacking on page 10 in reference to the MODE command and the COM1: port. Our example lackey is being severely punished for this one. Cornered, he coughed up the example which reads as such: **MODE COM1:300**

• Good news for the lower end modem market: *Hayes Microcomputer Products Incorporated* have reduced the retail pricing of all their 300 baud modems. The Smartmodem 300 now retails for $199.00, down from $289.00. The Micromodem //e with Smartcom I software is now priced at $199.00, down from $329.00. The Smartmodem 300 with Smartcom software for the Apple //c has been reduced to $239.00 from $339.00. The listed retail pricing is in American dollars.

Short Bits



• *IBM scientists* have made the world's densest integrated circuits. Using a novel fabrication process, the IBM scientists at the Thomas J. Watson Research Center have shrunk circuits into an area sixteen times smaller than permitted by present-day technology typically used in semiconductor manufacturing. The IBM chips are the first to be fabricated with a fully-scaled half-micron process — one in which the half-micron linewidths that define the circuits are used throughout the chip. Production chips today typically use two-micron linewidths. To give you an idea of the scale involved, approximately 150 half-micron-wide lines would fit within the width of a human hair.



• According to *3M Canada Incorporated*, disks using new stretched surface recording (SSR) technology, which combines the performance characteristics of rigid disks with the low cost and environmental tolerances of flexible media, may be available in Canada during 1985. Involving stretching a magnetic-coated plastic film over booth sides of a rigid plastic frame, the technology reduces the media's physical distortion to less than one-tenth that of a diskette. 3M reports prototype SSR media support the 500+ tracks per inch density of today's high volume fixed disk drives.

/usr/group/cdn

UNIX

YOURS TO DISCOVER

• A Canadian trade association, */usr/group/cdn*, has been formed for UNIX users. The association's mandate is to encourage cooperation and mutual assistance among suppliers and users of UNIX and UNIX-compatible systems. /usr/group/cdn plans to increase Canadian UNIX recognition through affiliations with governments, special interest groups and other associations in Canada. Membership within the association is limited to individuals, though a corporate sponsorship program is offered. Interested parties can contact Barbara Dempster of /usr/group/cdn at (416) 465-1699.

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TURBO pascal version 2.0 and sidekick. Authorized Borland Dealter — Specify computer — Each Only $69.95 + — **VECTOR COMPUTER SERVICES,** 32 Falconer Terrace N.E., Calgary, Alberta, T3J 1W4, (403) 280-4185.

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APPLE software rental. The Pacific Apple Computer Club lists over 500 Apple Programs. Most rentals only $6.00 you keep the disk. For catalog send $1.00 canadian to **P.A.C.C.** Box 25, Point Roberts, Wa. 98281.

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LIST!

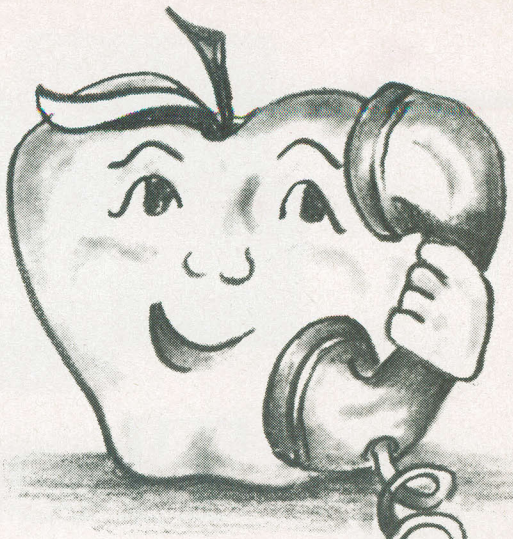
Two Column List Program
by David Huggett

Written on an IBM PC compatible, this program sends any BASIC program saved in ASCII format to the printer in compressed mode, and in two columns. A paper saver, this.

```
1 CLS:DIM A$(500):PRINT TAB(18);"TWO COLUMN LIST PROGRAM by David Huggett":PRINT
:PRINT
2 LINE INPUT"Enter the Basic program saved in ASCII format that is to be printed
 in the two  column mode. ",D$:PRINT:PRINT
3 PRINT"Reading file, one moment please...";:OPEN "I",#1,D$
4 IF EOF(1) THEN 7
5 S=S+1:LINE INPUT #1,A$(S)
6 IF LEN(A$(S))>66 THEN 12 ELSE 4
7 J=INT((S+1)/2):LOCATE 8,1,0
8 PRINT"Listing length =";J;"rows, or";INT(J*10/6)/10;"inches."
9 PRINT:INPUT"Ready printer and press RETURN to print.",X
10 WIDTH 255:LPRINT CHR$(15);CHR$(27);"Q";CHR$(137);CHR$(27);"6"
11 FOR R=1 TO J:B$=A$(R+J):LPRINT A$(R);TAB(70);B$:NEXT:END
12 FOR N=66 TO 58 STEP -1:IF N=58 THEN N=66:GOTO 14
13 IF MID$(A$(S+V),N,1)<>" " THEN 18
14 F$=STRING$(LEN(STR$(VAL(LEFT$(A$(S),5)))),32)
15 A$(S+1+V)=F$+MID$(A$(S+V),N+1,LEN(A$(S+V))-N):A$(S+V)=MID$(A$(S+V),1,N)
16 IF LEN(A$(S+1+V))>66 THEN V=V+1:GOTO 12
17 S=S+1+V:V=0:GOTO 4
18 NEXT N
```


Computing Now! Advertisers Index

A User's Almost Guide to Every Computer Made



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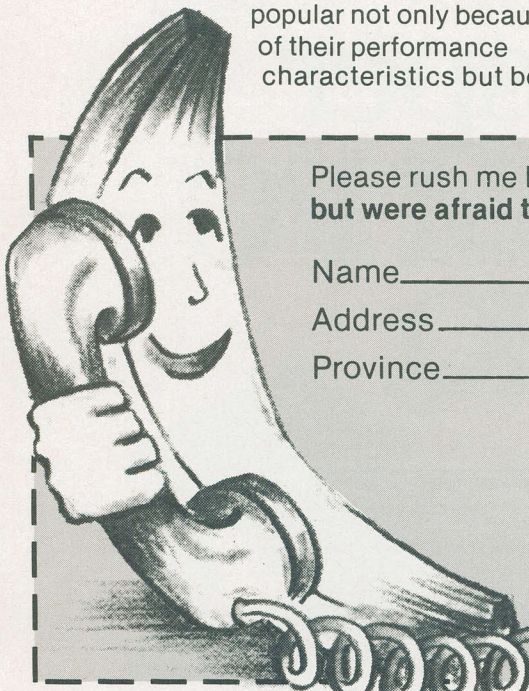

Please rush me **Everything you always wanted to know about modems but were afraid to ask** — plus the names of dealers nearest me.

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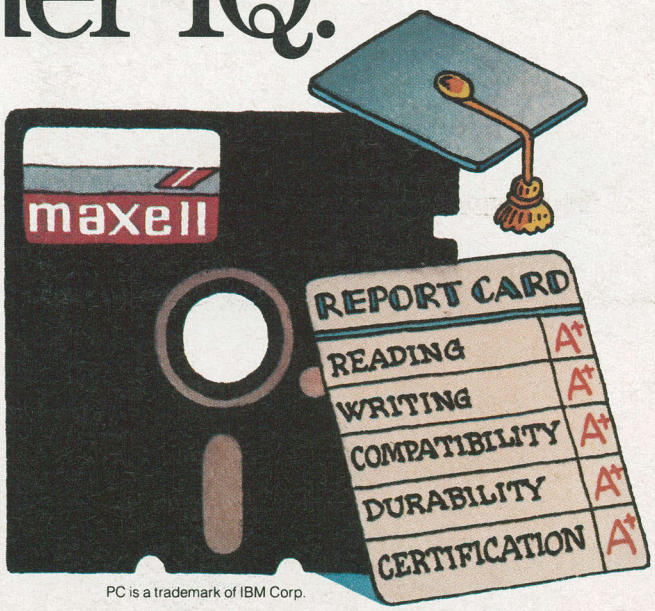

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